Castes in India : implications of social identity in economics

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Résumé

Cette thèse s'inscrit dans le courant de pensée qui vise à réintégrer les institutions et l'identité sociales en économie et ce pour trois raisons. Premièrement, de nombreuses expériences comportementales ont mis à mal le modèle conventionnel de l'agent égoïste maximisateur en raison notamment du rôle joué par les normes sociales. Deuxièmement, les groupes sociaux, et l'identité qui en découle, peuvent déprécier les attentes des individus les plus démunis et limiter leurs "capabilités" selon le terme de A. Sen. Dernièrement, ces institutions peuvent contrecarrer l'allocation efficiente des ressources. Dans cette thèse, nous présentons un modèle qui décrit la ségrégation comme un des équilibres provenant d'une distribution inégale du pouvoir. L'intérêt de ce modèle réside, premièrement, dans la reconnaissance que les sociétés ségréguées sont aussi celles où le pouvoir est très inégalement réparti, deuxièmement, dans le fait que la ségrégation peut apparaitre en l'absence de préjugés, troisièmement dans les définitions données du pouvoir et de la ségrégation qui sont suffisamment amples pour recouvrir un grand nombre de situations, et enfin, dans le processus qui mène d'une situation neutre à la ségrégation. Dans le second chapitre nous montrons que la caste détermine considérablement le statut social perçu des intouchables et des tribus. Néanmoins, d'autres facteurs comme le revenu, la profession et dans une moindre mesure l'éducation ont aussi une importance. De plus la caste a un effet à la fois direct et indirect, ce dernier s'exprimant par une influence réduite du revenu sur le statut social perçu. Nous interprétons ces résultats comme l'internalisation de la discrimination subie depuis des siècles, qui abaisse l'image de soi et diminue les attentes. Dans le troisième chapitre, nous mettons en évidence la persistance des pratiques d'intouchabilité. Nous montrons que le nombre de crimes contre les intouchables est positivement relié à une distribution communautaire de l'eau. Les règles de castes prohibent le contact des intouchables avec les sources d'eau des castes supérieures. Bien que ces règles soient anticonstitutionnelles, elles sont encore largement appliquées et de manière violente. A priori, ces règles ne concernent pas uniquement l'eau mais aussi une grande partie des biens publics, ce qui laisse à penser que ces derniers sont en réalité des biens de club ou de caste. Ce dernier point est étudié dans le chapitre 4. Nous montrons que si l'indice de fractionalisation a un effet sur la présence dans les villages de biens publics, cet effet est essentiellement positif. En revanche les indices de polarisation ne semblent pas avoir d'impact. Nous interprétons ce résultat, contraire à bon nombre de ceux obtenus auparavant, comme le fait qu'il existe du patronage de castes. Cette hypothèse est testée à la fin du chapitre. Les résultats semblent indiquer que les castes s'approprient l'usage des biens fournis publiquement. En conclusion, nous proposons des pistes de recherche, visant, essentiellement, à améliorer la compréhension de la formation des identités sociales et les raisons de leurs mises en exergue.

Abstract

This dissertation relates to the literature on the implications of social institutions and identities in economics, through a focus on the institution of castes. Three reasons motivate the analysis of castes in economics.

The Under-socialized Homo Economicus

One of the motives for the analysis of caste lies in the shortcomings of the standard conceptual framework used in economics. The *Homo economicus* is conventionally viewed as a self interested maximizing agent, whose preferences are exogenous. He was not much considered in his environment. As Becker and Murphy (2003) writes "modern economics [...] typically assumes that individual behavior is not directly influenced by the actions of others". However, all the assumed characteristics of the *Homo economicus* have come under scrutiny impelled by (a) criticisms addressed by other social sciences, (b) the regain of interest for earlier theories that either contested one or more of these characteristics (Bowles and Gintis, 2000) or insisted on the roles of institutions and (c) the "accumulation of abundant anomalies" (Ostrom and Ahn, 2003). First, new institutional economics challenged the assumption of costless information and modified the instrumental rationality assumption to account for cultural differences. However, this set of theories maintained the assumption of a consequentialist behavior, while economic anthropology tended to refute it on the basis that choice may not be driven by a scarcity of means but rather by a social context. However, this last discussion was, oddly, confined to anthropology. The important point is that the accounting of institutions led to a modification of the instrumental rationality hypothesis and the accounting of cultural variations.

In the 1990's the impressive development of the literature on social capital (Ostrom and Ahn, 2003) was a strongest attempt at recasting the economic agent into his social environment. Yet, this posed the question of freedom of choice. If social capital has such a large impact on agents' behaviors, then the only space left for free choices was who to associate with, i.e. the level of social capital (Becker and Murphy, 2003). However, many arguments, including the analysis of stratified societies such as that of castes, could be invoked to show that agents rarely choose their levels of social capital (Bowles, 1973). This points shows how ill at ease economists are when dealing with social interactions.

Another attempt at reintegrating social relationships came with the modification of the assumption that agents are not concerned with the direct effect of their actions on others. Indeed, they may include in their decision process the fact that

other individuals may respond to their actions. They are not concerned with the consequences of their actions out of altruism, but rather out of self interest and because others may backfire. Thus, social relationships were viewed in terms of strategic interactions (Akerlof, 1976). However, pure self interest is not sufficient to explain why individuals do incorporate the effect of their behaviors on others (Basu, 1997). Basu (1986) argues that virtually any economic behavior and markets depend on adherence to some basic social norms. "Self interest and policing cannot always explain why individuals do not run away without paying after a haircut" (Basu, 1986). Thus norms ought to be taken into account as they are an important component of behaviors. Many behavioral experiments make that point (Hoffman et al., 1996; Henrich et al., 2001) when their results conclude that Nash outcomes are rarely observed : behaviors are also driven by a genuine concern for fairness or cultural norms of reciprocity. The centrality of the social norm leads to the following question : "what is a social norm ?" The eclecticism of the answers given probably emphasize the intricacy of the question. We do not attempt to settle the debate, however the first chapter of this dissertation clearly fits into the debate.

Nevertheless, behavioral experiments clearly show that individuals have "other-regarding" preferences, that may be context dependent. For instance, the experiment led by Hoffman et al. (1996) suggests that norms of reciprocity decrease with social distance. Thus, it may be hypothesized that the balance between self and other regarding preferences actually depends on social identification.

Some fairly recent behavioral experiments stress the role of social identity in behaviors (Steele and Aronson, 1995; Shih et al., 1999; Hoff and Pandey, 2006; Chen and Li, 2009). This influence may stem from a utility derived from identity and one derived from complying to the norm or ideal set by the group one identifies with. Psychological experiments have already emphasized the anxiety experienced by individuals whose behaviors contradict their believes. This anxiety is referred to as "cognitive dissonance" (Festinger et al., 1956) and most of them will endeavor to reduce this anxiety through the adaptation of their believes, i.e. through an *a posteriori* rationalization. Thus not acting in conformity with a group's norms may induce cognitive dissonance and this may explain why social identity has such a strong influence on behaviors. In the second chapter of this dissertation, we will investigate the influence of caste on perceived social status. Arguably caste has been a strong determinant of social identity in India. The system ascribed a status to some groups, such as the former untouchables, the Scheduled Castes ("SCs"). When *privately* asked to rank themselves on a social scale, SCs would pick a rather low position because of their castes. This is an example of how a norm has been internalized by individuals. This last point had already been addressed by A. Sen when he criticized the utilitarian framework. This is reviewed in the next paragraphs.

Sen's capability approach

First, let's recall the ambition of what was once called political economy, that is, to make it short, the promotion of social welfare. Because utilitarianism asserted itself as the predominant conceptual framework, social welfare was seen as arising

from the maximization of individual utilities. Yet, Sen (1992, 1999a) criticized the use of utility as a metric on two grounds. First, "a thoroughly deprived person, leading a very reduced life, might not appear to be badly off in terms of the mental metric of desire and its fulfilment, if the hardship is accepted with non grumbling resignation". (Sen, 1992). Because individuals may adapt their preferences to what seems attainable, they may not be dissatisfied with strikingly unfair situations. Thus the use of utility as a yardstick may lead to an improper assessment of inequality. A. Sen also criticized the focus on income as the main argument of the utility function, for there is a great heterogeneity in individuals' capacity to convert income into well-being. Such a variance may stem from both individual and groups' characteristics. Experiments concur on this view by showing that utility derived from income largely depends on the group the individual compares to. Sen (1992, 1999a) proposed to substitute utility for the concept of capabilities, that can be summarized as the freedom to lead one type of life or another. Inequality is better assessed through the distribution of capabilities. Sen (1999a) identified five freedoms that are instrumental to advancing capabilities and that are : economic facilities or the freedom to use resources for consumption and production, social opportunities such as access to health and education, political rights, transparency and security.

This is all fine but what about castes ? First, I would argue, based on recent research and experiments, that the institution of castes and the related identity do alter expectations and ambitions. An interesting experiment in that respect is the one conducted by Hoff and Pandey (2006). Children from Northern India were asked to solve mazes. When caste identity was made public, either the performance from the lower castes children dropped or they withdrew from the game. The authors argue that once identity is made salient, lower castes children either tend to conform to stereotypes or expect discrimination to occur and conform to it. This is one of the many behavioral experiments that evidenced stereotype threat and self discrimination. Caste identity does modulate individuals expectations. Second, if utility derived from income is expected to depend upon the comparison group, the relevance of social identity in well being is rather obvious. Third, it makes little doubt that caste rules restrict the set of "functionings", as per Sen's words, especially for the lower castes. Untouchability practices prevent lower castes from entering public facilities such as schools, hospitals or even village centers. This was acknowledged by the Constitution of India that stated in its 15^{th} article of the Fundamental Rights that "no citizen shall, on grounds of [...] caste [...] be subject to any disability, liability, restriction or condition with regard to (a) access to shops, public restaurants, hotels and places of public entertainment ; or (b) the use of wells, tanks, bathing ghats, roads and places of public resort maintained wholly or partly out of State funds or dedicated to the use of the general public [...]". If we acknowledge that lower castes are excluded from public places and resources, they do not have access to economic facilities and social opportunities defined by A. Sen. It becomes rather clear that untouchability do limit capabilities.

The second and third issues are addressed in this dissertation. Chapter 2 investigates the determinants of Hindus' perceived social status and more particularly the impact of being from a Scheduled Caste or Tribe. Chapters 3 and 4 addresses

the issue of exclusion from public goods usage on caste grounds. They show that untouchability practices are still common and violently enforced despite them being outlawed. In this case, four of the five instrumental freedoms defined by Sen (1999a) are violated. First, some individuals may be excluded from economic facilities and social opportunities by being banned from using public goods. Second, transparency and security are all but guaranteed if caste based rules are violently enforced regardless of the law.

Castes Distort Resources Allocation

The last argument for looking into the implications of the institution of castes, is that it interferes with an efficient allocation of resources. This point was first addressed by Akerlof (1976, 1980). Employment discrimination against lower castes is an example of the distortions introduced by the institution in the labor market and of its interference with an efficient resource allocation. Another example, is the supposedly negative impact of social fragmentation on the provision of public goods, discussed in chapters 3 and 4. This is a more practical motive for the study of castes as it has serious consequences on policy design. For instance, public goods availability is a central issue for economic development and a key concern of many developing societies. Results from a voters survey conducted in 1996 in India show that the second most popular concern was related to public goods[1]. Nevertheless, if caste rules prevent some groups from accessing public goods, development programs and policies, that are often oriented towards an increased coverage of public goods, may miss their targets.

Chapter 1 : Power and Endogenous Segregation

At the beginning of Chapter 1 we question whether segregation may occur even without the intervention of discriminatory norms or preferences. This assumption is somewhat at variance with a large part of the literature on segregation and discrimination. Indeed, whether Becker (1957) or Arrow (1971), or even Schelling (1969) all posited the existence of prejudice, even in the slightest form, to model discrimination. The model presented in Chapter 1 strives to depart from this assumption.

This chapter models an infinitely repeated prisoner's dilemma with random matching. A group is assumed to have a power of influence over others. Power is defined as the capacity to give someone else access to opportunities that would be unreachable otherwise, which in political science, is often referred to as a "power of influence" or "reward power" (Raven and French, 1958). Thus the concept accounts for a broad array of powers including political, religious or economic. As a result of this power, the powerless will perceive an additional benefit in cooperating with the mighty. They will increase their propensity to cooperate and the mighty will respond by increasing theirs as well, which prompts a new increase in cooperation from the powerless, up to a point when they will cooperate for sure with the powerful. At this point, the mighty's best response will be to reject any cooperation with the powerless, who will respond by systematic defection. This systematic refusal to

[1] In Banerjee and Somanathan (2007)

cooperate is how we define segregation. Hence segregation can be an equilibrium resulting from unequal power distribution.

The mechanism brought forward in this chapter is supported by a couple of historical examples and serves as an explanation of the strong segregation between castes. First, some theorists have seen the origin of the caste system in the dominated Aryans' willingness to stay away from the conquered. The power capture by the Aryans is likely to have been contemporaneous to the design of segregation rules that would separate the conquerors from the conquered. Although this theory is disputed on many grounds (Klass, 2004), it remains one of the most commonly accepted about the origins of caste. Second, in Vedic times, fire sacrifice was central as this was the main way to gain the deities' favors that would ensure worldly success. Yet the priests had a monopoly over sacrifices and rituals. As such, they had a power of influence that placed them above the crowd. In the vedic texts who codified the vedic religion, many clues can be found indicating that there was already some form of segregation, at least between the priests and the rest of the population. The reversal of vedic values that occurred between the V^{th} and the II^{d} centuries B.C. could have jeopardized the priests supremacy. Doniger and Smith (1991) argue that the ethos developed by the priests at that time that ensured proper segregation was coming from the priests efforts to maintain, or even firmed, their superior positions. It is also striking that the top *varnas* described in the texts are the one endowed with some sort of power. The Brahmans had had a monopoly over spiritual affairs and the *Kshatriyas* over political affairs. On a different note, historical recounts of the colonization process admit that early European settlers tended to mingle with local societies. Yet, when foreign power was more firmly established, condescending ideologies about the "natives" started appearing.

This model has several compelling features. First, it recognizes that segregated societies are often the ones that exhibit a highly unequal power distribution, which is a point that has been little addressed. Second, the definition given to segregation as a systematic refusal from two groups to cooperate, is large enough to encompass various situations from marriage to geographical segregation. Indeed, segregation if often thought of as being the geographical separation of two groups. This probably is only the tip of the iceberg as segregation manifests itself in many aspects of every day life, such as manners, conversations or jokes, for instance. Similarly, the way power is defined is large enough to account for various types of segregation such as the separation between the clergy, the aristocracy and the commoners. Third, the process described by the model has an interest in itself and more particularly that rejection is a result of the powerless striving to cooperate. Many examples drawn from day to day life could illustrate this point. Think of a child that desperately wants to make friend with another one. If the desire is too obvious or intense, he will likely be turned down.

The model also has a couple of drawbacks and section 6 presents ways for improvement. First it can not be reasonably claimed that the segregation equilibrium is unique. Second, in an attempt to bring forward the process of segregation formation, the model is not written in a canonical way. Adopting an evolutionary version

of the model might help at tackling both issues. Another envisaged improvement would be to design the creation of a third group arising from cooperation between the mighty and the powerless and who would be endowed with a fraction of power. Besides, in the model presented,power is left constant, while it could be thought to be negatively correlated with the number of powerful individuals. Lastly customs could be introduced as a signal or a device aiming at enforcing cooperation within a group. Indeed, it is striking that constraints imposed by customs on lifestyles, such as for instance vegetarianism, are much harsher on higher castes than on the lower ones. All these potential improvements are left for future research.

Chapter 2 : Social Identity in India : Caste and Beyond ?

This chapter inquires into the determinants of perceived social class among Hindus. More precisely it addresses the following questions : is caste the only determinant of perceived social status or are they other relevant factors that could eventually mitigate its effect ? If there are other determinants, do they have a similar effect across all groups ? For instance, education may be efficient at improving social status, but only so among high castes. The analysis is based on data collected in the 1995 and 2001 rounds of the World Values Survey. We are particularly interested in one of the question asked during the survey : "to which of the five social classes do you think you belong to ?". Data cover 8,543 households although caste is informed only for the 3,403 Hindu ones. Therefore, results obtained in this chapter can not be generalized to other religious denominations.

The analysis yields three main results. First, and this is no surprise, being either from a Scheduled Caste or a Scheduled Tribe is a major determinant of perceived social class, but is not the only one. Both income and occupation, whether supervisory, or involving either human or physical capital do have a significant impact. Education is also relevant although to a lesser extent and the divide lies between primary and secondary or higher education.

Second, the impact of caste on perceived social status is somewhat smaller among the Scheduled Castes than among the Scheduled Tribes, although their ritual status is, arguably, quite close. Large, yet plausible shifts in income or occupation could make up for the caste effect, as far as Scheduled Castes are concerned. For instance, the acquisition of land or skills can annul the caste effect. On the other hand, only very unlikely improvements could hardly compensate for the tribe effect. However, this result may be driven by a potential sampling bias. The same analysis ran over a sub-sample conclude that the impact of being from a Scheduled Caste was underestimated and that of being from a Scheduled Tribe overestimated. However, concurrent with previous results, the analysis shows that being from a scheduled group has a strong effect on perceived social status and that plausible, albeit large, shifts in either occupation or income can compensaye the scheduled group effect.

Third, being from a scheduled group is found to have both a direct and an indirect effect on perceived social status, the latter being that an increase in income may have a reduced effect on perceived social status among Scheduled Castes. The

group's effect is actually mainly indirect for the SCs. Once the effect of income is allowed to vary across groups, the direct effect of belonging to a Scheduled Caste disappears. On the other hand, the tribe effect is essentially direct. The indirect caste effect may be interpreted as a remainder of long lasting discrimination. SCs do not rank according to their wealth probably because they are untouchables. This is not without echoing the stereotype threat and self discrimination phenomena evoked above. Group membership may thus lower ambitions and expectations.

It is noted at the end of this chapter that the actual group's effect may be underestimated given that data were collected during face to face interviews. It is likely that if the social class had been declared publicly, the group's effect may have been larger. Potential discrepancies between the privately and publicly declared social class, if they exist, would be worth investigating as it would highlight the pressure put on social identity directly by the immediate environment. It would not measure an internalized social identity as in our analysis, but rather the one imposed by others. We even could hypothesize that discrimination has three facets : (a) a diminished self image, even when not confronted to the opinions others have about ego, (b) the modification of this percieved self-image when confronted to others' views and (c) how others perceive the individual. Disentangling the three would shed new light on discrimination. It is left for future research. Moreover, local social composition may be thought of having an effect on the group's effect. It is plausible that SCs would better rank if they live in predominately SCs villages. Although best efforts were made to control for the local social composition, the analysis comes up against a lack of data. These challenges are left for future research.

Chapter 3 : Is Blood Thicker Than Water : Untouchability and Public Infrastructure

This chapter addresses the issue of caste based violence. Caste strongly defines the use of common resources mainly through the prohibition put on the sharing of these resources between castes, particularly with outcasts. For instance, Shah et al. (2006) surveyed 565 villages and found that in nearly half of them, untouchables were denied access to water facilities. In 28% of them they were denied entry into police stations, and in 18% access to the road or primary health centers. This prohibition is what is referred to as untouchability and is most salient in the case of water. Untouchability is grounded on the belief that outcasts are impure and that any form of contact with them is tainting. Food and water are the paramount conveyor of ritual pollution. Water is considered tainted if an untouchable or his vessel touch it. Despite a large heterogeneity in the compliance to the caste code, outcasts are, more often than not, banned from using higher castes wells. Indian local newspapers abound with stories of untouchables being beaten up for having used higher castes wells. This phenomenon is quantitatively investigated in this chapter, where the number of acts of violence against untouchables is shown to be associated with the way water is distributed. The more common and shared the source, the larger the number of acts of violence against untouchables.

The analysis is based on data on the number of acts of violence against SCs

and STs, collected by the National Crimes Record Bureau of the Indian Minsitry of Home Affairs (based on the complaints filed by the local bureaux). The data cover 581 districts for the year 2001. They are then linked to Census data on the percentage of the population that access water through wells, tanks, tubewells or taps. A principal component is constructed for these four water sources. The component decreases with the individualization of the water source. For instance the component is minimized if the entire district's population access water through taps. On the other hand, it is maximized if they all access water through wells. Please note that what is meant by individualized source is one that is less sensitive to ritual pollution. For instance, tap does not entail physical contact with the source and as such it is less prone to ritual pollution. It is sad to be individualized. Although, I must admit that the choice individualized as opposed to common is not very fortunate, I carry on with it for the sake of conciseness.

Results show that there is a positive relationship between the commonality of the water source and the number of acts of violence against untouchables. This relationship is robust to many controls, including caste and religious polarizations, states measures of wealth, human development, fixed effects and measures of other public infrastructure. It is noteworthy that the percentage of villages that are connected by road as well as the number of primary school per district's inhabitants do seem to significantly reduce the number of acts of violence against untouchables, although this result is note definite as the lack of roads may proxy remoteness. Finally, quantile regressions show that the effect of the water distribution mode on the number of acts of violence, is most strongly felt when the level of violence against outcasts is already relatively high.

The results presented in this chapter show that, despite untouchability practices being outlawed, they are still common and violently enforced. Moreover, based on the evidenced relationship, it is argued that water development programs, who primary aim at improving health, exhibit a nice side effect of reducing caste based violence. It is not claimed that extending tap water will uproot caste conflicts. Rather, it is argued that it would remove a serious bone of contention between castes and provide some relief to the "weaker segments of society" on top of enhanced sanitation, while more definite measures must be considered to eradicate castes. This chapter, as well as other empirical studies such as that of Shah et al. (2006) question whether public goods are truly public in India. Indeed, if some individuals are prevented from accessing water sources for instance, one may wonder if these resources do not better compare to club goods rather than public goods. This hypothesis is what chapter 4 challenges.

Chapter 4 : Social Fragmentation and Public Goods : Polarization and Patronage in Uttar Pradesh and Bihar

Theoretical and empirical results have concluded that there is a negative relationship between social fragmentation and the provision of public goods through limited collective action. I argue that this literature exhibit four drawbacks. First, empirical results are mixed, at best, and the relationship has not been firmly establi-

shed. Second, it rests on the implicit assumption that social fragmentation induces groups antagonisms. Third, this last relationship has never been firmly established and even if it actually existed, polarization indices would be more appropriate than the fractionalization index traditionally used to prove that social fragmentation lowers public goods provision. Fourth, the intervention of ethnic patronage has little been considered. As Alesina and Ferrara (2005) pointed out "while pure public goods may be lower in more fragmented communities, the amount of publicly provided "private" goods - especially those that can be targeted to specific groups - may be larger. We can then have a positive correlation between fragmentation and ethnically based patronage".

These four points are addressed in this chapter and more specifically the patronage assumption. The analysis uses the data collected by the World Bank during the Survey of Living Conditions in the northern Indian states of Uttar Pradesh and Bihar in 1997 and 1998. The likelihood for a village to have six public goods present is assessed depending on the village's characteristics. These goods are connections to the electric, road and bus networks as well as the presence of a waste disposal system, a primary health center and primary public school. The fractionalization index exhibits a positive and significant impact on the presence of four of these goods, and a negative significant one on the presence of primary public school. This result is robust to the inclusion of indicators of caste dominance and state fixed effect. However the significance of the positive coefficients is weakened by the introduction of inequality measures. This positive impact is somewhat at odds with the results obtained by previous empirical analysis who largely displayed a negative impact. The fractionalization index is then replaced by polarization indices in order to better stick to theoretical assumptions and conclusions. Results show that polarization in almost never found to have an impact on the presence of the goods.

Why would the fractionalization index be relevant when the polarization index is not ? Let's recall that the former is closely and positively linked to the number of groups in the society, while the latter is decreasing in the number of groups and is maximized when the population is clustered into two equally sized groups. Then the number of groups seems to positively influence public goods provision while potential group antagonisms play little role. A possible explanation might be patronage. Indeed, if every group endeavors to have a "caste good", the larger the number of groups, the larger the likelihood to have the good present in the village. I therefore try to evaluate whether the probability for a household to have access to a specific good, provided it is available in the village, depends on its membership to the village's dominant caste. The latter is defined as the caste that collectively owns the largest value of land. For instance, does the likelihood for a household to send their children to school, provided schools are present in the village, depend on belonging to the dominant backward agricultural caste ("BAC") ? Although results do not clearly and firmly answer the question, they do provide some support to this assumption. It is found that belonging to a backward agricultural caste does significantly reduce the likelihood to have toilets facilities or to attend anganwadi centers, except when the village is dominated by this caste. Similarly, the coefficient for having electricity at a BAC home when the village is dominated by the BACs is

positive and close to significance.

This study is rather exploratory and data scarcity is somewhat of a problem given that they only cover 120 villages. Nevertheless, it casts some doubts on the fact that social fragmentation may have a negative effect on public goods provision. The idea lurking at the back of the latter assumed relationship is that social fragmentation induces antagonisms and confrontations. However, this relationship is not firmly established. As Esteban and Ray (2008) noted "by and large, it is fair to say that most of the literature fails to find any significant evidence of ethnic fractionalization as a determinant of conflict". Moreover, what this assumption sidesteps is the existence of intergroup norms that govern the relationships between groups, such as patronage or exclusivity. What may prompt violence is the challenge of this norm as seen in the previous chapter, not fragmentation itself.

These results coupled with the ones found in chapter 3 do strongly suggest that caste rules and norms impede universal access to public goods. Publicly provided goods may be seen as "caste goods". This is quite worrying and even more so if we bear in mind that universal public goods availability often is a priority of many development programs and a key concern.

Conclusions and Agenda for Future Research

Several examples of how the institution of castes limits capabilities were provided. First, long-standing discrimination has influenced the way low caste and tribes perceive their social status in both direct and more insidious ways. Second caste based rules and untouchability practices are still enforced regardless of the law and somewhat prevent lower castes from accessing public goods. Thus, the institution of caste thwarts many freedoms that are instrumental to development such as economic facilities, social opportunities and the need for security. Moreover the conflict between legal and caste based rules hampers transparency. From a more practical point of view the influence of castes on public goods access may divert the objectives of development programs to spread public goods access.

Yet, all is not doom and gloom. The scheduled group effect on perceived social status may be canceled by shifts in occupations or income. Moreover, the results displayed in Chapter 1, suggest that the redistribution of power might weaken the segregation that still seems to prevail. Access to primary education was shown to be exempt from patronage and seems effective at reducing caste based violence.

This work has raised many issues that are worth addressing and are left for future research. First, perceived social status may differ when it is privately expressed, as it is the case in the database used in Chapter 2 and when it has to be publicly declared. As a consequence, the caste effect may differ as well. The study of such a potential discrepancy may prove valuable to assess the amount of discrimination anticipated from others and that would come on top of an internalized diminished self-image. I would hypothesize that discrimination is the meeting of a diminished self image and of the opinions others have.

Second, I propose to investigate the influence of the local social composition on the constraint put by caste on identity. For instance, would the feeling of alienation due to group membership experienced by an outcast depend on the outcast population of the area where he lives ?

Third, there still is work to be done on the conceptualization of a polarization index. The one promoted by Montalvo and Reynal-Querol (2002), which appears to be the most widely used, displays two related inconveniences. It holds intergroup distance constant and neglects the issue of income distribution. I would argue that intergroup distance, even if group is defined along ethnic lines, largely depends on those groups relative and collective wealth. Suppose that there are three groups, A, B and C and that C is extremely poor while A and B enjoy a similar collective wealth. The social distance perceived between C and A is probably different from the one experienced between A and B. This should be reflected in the index. Moreover, wealth distribution within the ethnic group may alter the sense of identification to the group. A poor individual in a rich group, may put more stress on his identity as a poor than on his ethnic denomination. Finally, a society that is said to be polarized because of the structure of the population distribution, is even more so if the pattern of the income distribution follows that of the groups and this should be reflected in the index.

Finally, a more general question permeated the dissertation. Why do agents pick a trait among many and define themselves according to it ? For instance, in India, there are many factors that may define social identity such as religion, caste, language, eventually ethnicity, gender just to mention the most obvious ones. Then the question is : under what circumstances will individuals stress one identity rather than another ? What factors make the religious denomination more relevant than caste ? These questions are fraught with consequences. If identities change depending on the circumstances, how can we properly assess social fragmentation or polarization ? This would suggest that strong identity factors such as ethnicity for instance are not exogenous but constructed. Moreover, how come that an identity factor that was merely conscious, all of a sudden becomes so marked that it may prompt violence and conflicts ?

These propositions for future research are by and large not exhaustive. They may seem ambitious, although they probably are incommensurate with the questions posed by social institutions and identity. Recent economic literature has drawn attention to them and there is little doubt that it will be a promising area for future research.

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Introduction

I'd like to start this dissertation with a question frequently asked by my friends and family when they inquired about the topic of my thesis : "what do castes have to do with economics ?". The question was usually accompanied by a frown and the impression that they may not have understood correctly either the title or the specialty. After all, this is a good question. Why would economists be concerned with social relations and identities ?

There are many ways to answer this question and this is the objective of this introduction. To make it short and broad, a relatively recent economic literature has put the emphasis on the fact that the classical utilitarian framework and its self-interest maximizing agent left social relations and identities as a background noise. The *homo economicus* is rather lonely. The hitch is that this background noise is becoming louder up to the point that some authors argue that the welfarism framework ought to be recast (Sen, 1992, 1973, 1999b,c). More conservatively, other authors believe sufficient to include social capital as yet another argument in the utility function (Akerlof and Kranton, 2010; Becker and Murphy, 2003). Whatever the option chosen, incorporating social identity, of which caste in India is an example, into the economic analysis appears a necessity.

A point needs clarification. One could think, given that this work revolves around castes, that the analysis and the conclusions are limited to India. This view may be challenged on two grounds. First, many features of the institution of caste such as segregation, deprivation and community self management may be found in various degrees elsewhere. What surely makes this institution original is the ideology that supports it as well as its amazing resilience. It is no coincidence that authors who have insisted on its particularity mainly focussed on the ideology (Dumont, 1970). Second, by showing that this social organization has a pervasive influence in the economic arena, a case is made for transforming the under-socialized *homo economicus* into an agent whose preferences, motives or behavior are influenced by his social environment.

Before delving in more details into arguments justifying the economic interest of castes, which will be done in section 2 of this introduction, I shall provide a brief of castes in section 1. Experts may find it short, novices long but it hopefully contains all the elements necessary to understand what follows. The last section of this introduction discusses how my approach is related to the literature and outlines the plan of the dissertation.

1 Background on Castes

"Caste is an institution of great complexity". "The term caste itself requires some discussion. It has been used to mean different things by different people in a variety of situations. Indeed it is doubtful whether much will be gained in clarity by giving to the word a single rigorous meaning at the outset." So start the two chapters dedicated to castes in Beteille (1974) and written by two of the most prominent castes sociologists : A. Beteille and M.N. Srinivas respectively. Given the great intricacy of this social institution, the scope of this chapter is to modestly

provide some elements necessary to the understanding of the dissertation. It would be presumptuous to say that this is an extensive description of the institution. An attempt will be made in a first step to define some concepts that underlie part of the functioning of the system. In a second step, competing theories about the origins of the institution will be outlined. These will prove quite helpful in the discussion carried out in Chapter 1 about the potential origins of segregation. Yet, this approach may set the pitfall of believing that caste is an inflexible institution that has not changed for the last two millennia and that is deeply rooted in religious believes. Such an impression would be highly incorrect given that, if castes have managed to survive to deep political and economic changes, as well as to the introduction of various religions in the sub-continent, it is thanks to their great flexibility, its social and economic rather that purely religious roots as well as their role played in the local economic and political organizations. A brief account of the recent transformations undergone by castes will finally be given. One caveat is necessary. Although I endeavor to give the most accurate portrait of both theories and facts, I from time to time will have no choice but to resort to stylized facts and simplifications to preserve the clarity of the arguments.

1.1 Caste, dharma, karma and purity

1.1.1 The attributes of Castes

Although there is some debate between scholars, most agree on five attributes of a caste summarized by Dutt (1931)[2] : "without attempting to make a comprehensive definition it may be stated that the most apparent features of the present day caste system are that the members of different castes can not have matrimonial connections with any but persons of their own caste ; that there are restrictions, though not so rigid as in the matter of marriage, about a member of the caste eating and drinking with that of a different caste ; that in many cases there are fixed occupations for different castes ; that there is some hierarchical gradation among the castes, the most recognized position being that of the Brahmins at the top ; that birth alone decides a man's connection with his caste for life, unless expelled for violation of his caste rules, and that transition from one caste to another, high or low, is not possible". The five attributes are therefore (a) endogamy, (b) hereditary membership (c) occupational specialization (d) hierarchy, (e) commensality.

The most central attribute that probably underlies the whole system is endogamy and hereditary membership that go hand in hand. The other features deserve some discussion that may enlighten the role played by the concepts of ritual purity, *dharma* and *karma*. Caste names often describe castes' traditional occupation. For instance, *Bhandari* means barber in oryia, *Paraiyars* means drums players (usually during funerals) in tamil, *Bhangi* mean garbage men in hindi and *Kallar* thief in tamil[3]. However, this occupational specialization of a caste is not so much linked to the actual occupation of its members than it is a founding principle, a determinant of its nature. While the congruence between the caste's traditional occupation and the actual professions of its members might have been strong in ancient times, it

[2]cited by Klass (2004)

[3]This last occupation being considered as a profession requiring specific skills

may have not been the case in recent periods. For instance, the 1911 Census superintendent, Edward Blunt, noted that less than 50% of the Dhobis were actually laundry workers. 10% of the Brahmins were actually priests and 5% of the Charmars still worked as tanners[4]. One may ask why occupational specialization still is a prominent feature of caste, given that its correlation with the actual professions is quite weak. Some authors would answer by saying that the traditional occupation provides an indication of the degree of purity of the caste and hence a gross information about its status. For instance, having contact with death is considered a source of ritual impurity. Castes whose traditional occupation entails such a contact, such as tanners, or funeral drum players (*Pariyars*) are ritually impure. This does not mean that their occupations make them impure, but rather because they are impure, they have a monopoly over these sorts of activity and should dedicate to them. Now the question of why they are impure will be touched on in the next section. Note that the very idea that some castes are more pure than others implies a hierarchy. Yet, ranking does not only derives from a supposed ritual purity as we shall see later (section 1.1.4). Rules governing commensality, although not as stringent as those governing marriage, also stem from a differentiated level of ritual purity between castes. These points all direct attention to the concept of purity which should be described and explained.

1.1.2 Purity

In order to properly assess the centrality of the concept of purity and the implied hierarchy, we need to go back in time. About 2,000 years ago a population probably coming from the Iranian plateau or Caucasia, known as the Aryans, began settling down in the sub-continent. They brought along a large corpus of religious texts, the *Vedas*. This religion, called *vedic* laid many foundations for Hinduism and exerted a great influence on Indian thought. The *Vedas* put great emphasis on the role of fire sacrifices, and highly complex rituals for this purpose was monopolized by priests[5]. As Doniger and Smith (1991) mentioned in their introduction to a translation of the Laws of Manu, "the importance attributed in the Veda to the fire ritual can hardly be overestimated. It was from cosmic and primordial sacrifice that the universe was created, and it was because of the repeated sacrifices offered by humans that the universe continues. The ritual, done correctly and at the proper time was the workshop for manipulating the cosmic order itself. [...] Personal ends, as well as cosmic ones, were the fruit of sacrificial practices". Given the prominent role of sacrifice, individuals who had a monopoly over it could claim superiority. This was reinforced, Doniger and Smith (1991) argue, by a vision of the social world as a food chain, modeled after the "natural" one. "The Vedas depicts a life where I gain only at your loss, my prosperity entails your ruin, my continued existence depends on your death, my eating requires that you become food [...] and in those texts, the priests repeatedly declared themselves the highest class, the ultimate 'eaters'". And priests

[4]cited in Deliège (2004)

[5]It is interesting to note, as some authors have done, that there are many similarities between the Vedic religion and Mazdaism that later developed in Zoroastrianism. This similarities include a large focus on sacrifice especially through fire, the latter being envisaged as both a deity and a privileged way to communicate with gods, the preeminence of the sacerdotal class and the consumption of *soma* a beverage that enhanced contacts with gods.

claimed that superiority on the basis that they controlled over sacrifice. Ritual was thus the source of social and political power. However, such a superiority might have been frail given that it could have been easily overturned by actual physical violence.

Sometimes between the V^{th} and II^{d} centuries B.C., a complete reversal of the Vedic values took place. The sort of Hobbesian view of the world was replaced by a great emphasis on *amhisa* or non violence, grace, humility, love and renunciation. The new virtuous were vegetarian, devotional, and non-violent. Texts like the *Bhagavad Gita* of *bhakti* or devotionalism, composed around that time, do insist on these new ideals. Texts composed around the same period, the *dharma sutras* extol the virtues of renunciation that should be set up as principles of life (*dharma*). As Doniger and Smith (1991) highlight by quoting Zimmermann (1987) "A new type of opposition between men was introduced. It was no longer a matter of courage and fear, domination and servitude ; it was instead an opposition between the pure and the impure and a hierarchy of castes". Doniger and Smith (1991) add "Vegetarianism and non-violence became the principal signifiers of this 'purity' that jostled power, the new yardsticks for social ranking in the priestly and 'orthodox' reformation of Vedism documented in the *dharma* texts". With the introduction of purity, predominance of the sacerdotal class was firmed, "the ranking order of the social classes did not change. But the rationale for the ranking did[6]".

An important text endeavored to reconcile the Vedic traditions and the new school of thought, the the *Manu Smrti* or Laws of Manu. This text is of particular importance to us as a large part of it is dedicated to castes. It builds on an hymn found in the *Rig Veda* that describes the origin of the universe through the sacrifice by divinities of a "cosmic being" who gave birth to four groups or *varnas* : *Brahmins* originate from his mouth, *Kshatriyas* from his shoulders and arms, *Vaishyas* from his thighs and *Shudras* from his feet[7]. Because *Brahmins* originate from the noblest part of the supreme creator, the mouth, they are placed at the top of the hierarchy and are sole authorized to study and teach the *Vedas* and to perform sacrifices and rites. *Khsatriyas*, who originate from the arms, is the second best placed group and is dedicated to war and ruling. The *Vaishyas* main purpose is trade, while *Shudras* are made to serve the other *varnas*. The Laws of Manu also build on the concept of *dharma*. "Beginning in Manu, non violence is usually listed among other qualities that comprise universal *dharma*, applicable to all regardless of class or caste. Those castes who follow occupation entailing relatively little violence towards other beings and who practice vegetarianism were, generally and theoretically speaking, ranked higher than those who do not[8]". The Laws of Manu praise a *svadharma* or a class nuanced duty[9]. The fact that the *svadharma* of the priests is the general *dharam*

[6]Doniger and Smith (1991)

[7]The *varnas* are often interpreted as being the castes, yet, as we shall see later, strictly speaking they are not the groups Indians would refer to as their castes. Indeed, smaller groups called *jatis* are the "actual" castes

[8]Doniger and Smith (1991)

[9]Weber (1958) believed that untouchables almost never rebeled because they interiorized the religious concepts that legitimized their low position. More specifically, untouchables interiorized that it was right and moral to follow the duty of their castes, their *svadharma*, even if this entails deprtivation and subjection

ensues a hierarchical order[10].

One may question the pertinence of presenting the world-views at the beginning of this era to understand the actual working of castes today. The answer is that such a view introduced notions that were to have enormous ramifications for the history of religion in India and a large influence over Indian thought. Concepts such as non-violence, vegetarianism, the relative purity of a life style and most importantly *dharma* are all still very operative in modern days India. As Srinivas (1974) noted, "certain Hindu theological notions like *karma* and *dharma* have contributed very greatly to the strengthening of the idea of hierarchy, which is inherent in the caste system". Birth is the only way to acquire membership to a caste, yet birth is not an accident according to Hinduism. It results from accumulated actions in previous lives. If these actions were virtuous, a man is to be reincarnated in a high caste, while misconduct is sanctioned by a low caste reincarnation. "Thus the caste hierarchy comes to be an index of the state of an individual's soul. It also represents certain milestones on the soul's journey to God" (Srinivas, 1974). This point underlines the centrality of the concept of purity that was seen as so fundamental that one of the most prominent theorists of castes L. Dumont (1970), put it at the very center of the system and thought that anything in the social organization is to interpreted by this yardstick, wealth or power playing very little role. This last point will be nuanced by section 1.1.4. Caste prescriptions are reinforced by the important concept of *dharma* which has many meanings, one of which is "that which is right or moral" or "the universal law" to be followed. As Srinivas (1974) tells "a man who accepts the caste system and the rules of his particular sub-castes is living according to *dharma*, while a man who questions them is violating *dharma*. Living according to *dharma* is rewarded, while violation of *dharma* is punished both here and after. If he observes the rules of *dharma*, he will be born in his next reincarnation in a high caste, rich, whole and well endowed. If he does not observe them he will be born in a low caste, poor, deformed and ill endowed. Worldly position and success indicate the kind of life a man led in his previous incarnation".

1.1.3 Untouchability

Counterpart to purity is ritual pollution. As seen before, some castes are more pure than others by nature and due to their functions[11]. Assertions made above may be summarized by saying that the more violent the functions, the less pure the caste. Yet, I have so far resorted to the word violence, although it would be more accurate to say that contact with ritually polluting elements is the appropriate reference. The more involved with ritually impure elements, the lower the caste. For instance, anything that directly has to do with death is polluting. Thus, a caste whose traditional occupation is to prepare the dead or play music at funerals (*Pariyars*) are too much involved with death to be pure. Yet, it is not clear whether death is a violent

[10]One may be surprised that *Khsatriyas*, who are dedicated to war and ruling and thus violent ends, are ranked second. This probably is a concession made by theory to reality as power could only be ranked at the top. The point of emphasizing non violence is probably to secure the supremacy of the priests over the rulers.

[11]the two being closely tied if not equivalent

concept. Another example is the barber. Hopefully this occupation is not so much violent. Nevertheless, it is seen as impure, as it deals with human waste. Arguably violence and impure occupations are symbolically related, however to get a better sense of the gross hierarchy between castes, reference to the assumed pollution linked to occupations is more relevant. Ritual impurity is derived from the nature of the caste but also from ritually polluting elements. Pollution may then be passed on through contact with impure elements, including individuals from impure castes. A strong vector of ritual pollution is physical contact but also food and water. This explains why commensality is a feature of the caste system. Food and water may not be shared between castes that are too far away in the hierarchy, as this would result in the higher of the two being polluted. Caste prescriptions mainly rest on the absolute avoidance of contact, which prompts segregation. This last concept, in the case of caste has a broad acceptation, since it means the prohibition of any sort of relationships. Touching is prohibited. Inter-caste marriage is hardly conceivable. Higher castes must not accept food or drink from lower castes. Anthropologists do assess hierarchical distance between castes by the willingness to accept food and water by members of another castes. Breaking of these rules would thwart *dharma* and the violator would have to go through purificatory rites for minor infringements to excommunication for more serious ones. The disgrace would also affect his relatives.

Let's pause for a moment to add one caveat to this description. What has been said so far is rather "theoretical" should be understood as principles. In practice there is a large heterogeneity in their applications. Yet, I am tempted to say that such an heterogeneity depends on the actual social distance between castes. For instance, it may be more frequent for Brahmins to accept food or water from a relatively close, yet inferior caste, than it will be from the lowest caste. Social scientists who conducted field works and were most concerned with the actual practices rather than the theoretical ones, emphasized the strong divide that exist between a group of castes, collectively known as untouchables in reference to the fact that their contact is polluting to anyone. While distance between various castes may not be plain clear and inter-castes rules not stringently respected, distance between untouchables and the prohibition of their contacts by other castes is rather marked. Beteille (1965) in his study of a Tanjore village asserted the village's population could be grouped in three : Brahmins, untouchables and the rest. He argued that such a classification made sociologically the more sense. The point is that, even if castes rules are not strongly enforced, contact prohibition not so frequent, the "untouchability" barrier clearly stands.

However untouchability does not come down to ritual impurity. As Deliège (1994) mentions untouchability arises from "cumulative domination"[12]. "Socio-economic dependance, material poverty, social deprivation and a lack of political power combine to ritual pollution to make untouchables a special social category[13]". Economic dependance arises, among other factors, from the traditional system of production within villages. Untouchables' vocation was to serve other caste by providing ser-

[12]The term is borrowed from T. Oommen in "Sources of Deprivation and Styles of Protest : the Case of the Dalits in India", *Contributions to Indian Sociology*, 18, 1984,45-61.

[13]in Deliège (1994). Translation is mine

vices in relationship with wastes, blood, dirt and death to other castes, who were prevented from carrying out such activities in fear of being ritually polluted, or to contribute as agricultural laborers to the grain production. In exchange for these services, they had a claim on a share of the harvest. The amounts of services and the quantity of grains to be exchanged were fixed by tradition. This economic system is known under the term *jajmani*. The spreading use of money, among other things, progressively suppressed the *jajmani* system, and it has almost disappeared by now. However, the system left traces of it in the distribution of land ownership and in villages composition. Indeed untouchables are rarely dominant in villages. As Deliège (1994) recounts[14] "in the plains of Northern India, for instance, Chamars are together with other rural jatis, one of the most numerous caste. Yet in a sample of 167 villages, they are in a majority in only 16 villages, that may be fairly recent". Such an economic oppression was often accompanied with the negation of a political power. As for social deprivation, it arises from untouchables low ritual status that prevented them from entering public space, unless they had good reasons such as work, for this. Deliège (1994) provides a couple of examples. For instance, there was no well or other water sources in untouchables neighborhoods. Moreover untouchables were not allowed to draw water from higher castes wells as, either their direct contact, or that of their vessels would have polluted the well. Thus they had to wait for a higher caste to draw water and to pour it into their jars. Access to roads were also restricted. In Uttar Pradesh, higher castes shouted to warn that Banghis were coming. In Kerala, Pulaya had to shout every four or five steps while walking on a trail to warn that they were coming and when someone shouted back, they had to step aside. In Poona, untouchables were let inside the city walls between 9a.m. and 3p.m., when their shadows were short enough not to pollute those walking by. All these recounts are fairly old and common sense tells us that things must have changed and they have. First, the newly independent India enshrined in the Constitution the prohibition of caste based discrimination and of untouchability[15] and assigned to the State the duty to promote the educational and economic interest of the outcasts[16]. Positive discrimination policies were envisaged in the Constitution and put in place. Seats were reserved to the former outcasts, in the Administration, Assemblies as well as in Universities. The castes who were to benefit from these reservation policies were said to be "scheduled". Thus untouchables are administratively referred to as the "Scheduled Castes" ("SC"). Some Tribes were also scheduled for this reservation policy, given that they have suffered from long standing discrimination and deprivation in very much the same way as the SCs. We shall come back to the situation of tribes in a few moments. Whether this legislation is responsible for the emancipation of untouchables is not discussed here. However, it is hardly disputable that untouchables gained political visibility. For instance, the current Chief Minister of Uttar Pradesh is from an untouchable caste. Moreover, many untouchables have benefited from increased social opportunity and managed to substantially improve their economic position. Untouchables economic

[14] Translation is mine

[15] Article 15 and 17 of Fundamental Rights

[16] "The State shall promote with special care the educational and economic interests of the weaker sections of the people, and in particular, of the Scheduled Castes and Scheduled Tribes, and shall protect them from social injustice and all forms of exploitation". Article 46, Directive Principles of State Policy, Constitution of India

status are now more diversified. However, these successes should not be the details that distract us from the bigger picture. As Deshpande (2000a, 2001) pointed out, being an untouchable is still a strong predictor of economic deprivation and as it will be shown in Chapter 2 it is still a strong determinant of perceived social class. As far as untouchability practices are concerned, Chapter 3 will show that they still take place, despite the passing of many laws and acts. "Cumulative domination" underline the existence of potentially close relationships between power, wealth and caste. Before turning our attention to this point, which will be done in the next section, we need to, in order to close this discussion on untouchability, say a few words about the status of tribes.

Tribes in India constitute a fairly distinct group. They usually live in remote areas and have not mingled much with the rest of the population. They are in a majority in North Eastern states although they are found throughout the country. To start, tribes share some features with castes, such as endogamy, hierarchy precluding inter-dining and, in some cases, occupational specialization. However, it should be noted that this is a generalization, given that tribes are very diverse. Nevertheless, it is worth noticing that Bailey (1957) considered castes and tribes as continuum. Yet, are tribes part of a system as castes are ? Two cases may be identified. Either the tribe converted to Hinduism and, in such a case, it very much resembles a caste. A tribe's position position in the caste hierarchy depends on a large number of factors including the tribe's history. It may even be the case that members of a tribe allocated differently between castes ? Therefore a hierarchy may be found among members of a same tribe. In a second scenario the tribe kept apart from Hinduism and thus may not be called a caste, given that they lie outside the system. Yet, as mentioned in Carrin (2006) from an Hindu standpoint, the fact that the tribe is not part of the caste system, makes it "untouchable", in the sense that their contact may be polluting to a higher caste. Thus in the first case, it is difficult to anticipate the position of a tribe on a social scale, while in the latter, the tribe is very likely to be located at the bottom and to suffer from untouchability. Given that the tribes we are concerned with are the scheduled ones, they were recognized as "weaker segments of society" which means that they are likely to be at the bottom of the social scale, either because of their material or social deprivation. Although strictly speaking, we can not say that tribes are untouchables, it is likely that Scheduled Tribes will also suffer from the stigma as well.

1.1.4 Caste, Power and Wealth : a Tango Dance

The *jajmani* system emphasizes the strong relationship between castes and the economic arena, at least as far as agricultural production is concerned. Local political life was also organized by castes. Caste courts composed of the elders of a caste belonging to different villages were setting the norms to be obeyed within a caste and in inter-caste relationships as well as settling any issue arising in the community. Therefore, caste specialization as well as its influence over the local political life is (a) a tendency for each sub caste "to live in a separate social world" (Srinivas, 1974), although inter-caste and intra-caste solidarities should not be overlooked (Srinivas, 1955) and (2) to see a high correlation between castes and wealth. This prompts the

following question : are wealth and power distributed according to caste status ?

Sociology brought diverging views on this question. Louis Dumont (1970), insisted on the primacy of the ideology in the caste system. He argued, in a structuralist perspective, that caste was most prominently the materialization of an ideology based on ritual purity and, as such, status is assumed to be relatively independent from political or economic power. He insisted on the fact that while wealth and power have been the dominant forces shaping western societies, in India, religion has prevailed. His point of view has since been seriously challenged as (a) caste transcend religions, (b) religious allusions are rarely made in debates about inter-caste relationships and (c) as Baechler (1988) argued, *Pariyars* would be equally despised even in the absence if a religious ideology of purity.

Alleging that caste is independent from the distribution of power or wealth had Dumont stressed the concept of dominant caste that he borrows from Srinivas (1955) : "A caste may be said dominant when it preponderates numerically over the other castes, and when it also wields preponderant economic and political". Given the agrarian nature of villages in India, economic power often comes down to land ownership. Yet, Srinivas (1955) feels necessary to add : "a large and powerful caste group can be more easily dominant if its position in the local caste hierarchy is not too low". Thus, even if the distribution of power and wealth may be assumed to not directly depend on caste status, it must be reckoned that both are highly correlated. Bailey (1957) found "a high degree of coincidence between politico-economic rank and the ritual ranking of caste". For this author caste is a system of ranks which is "validated not only by ritual and social usage, but also by differential control over the productive resources". He adds "but the correlation [between economic and ritual status] is not perfect. For castes groups in between the two extremes, their ritual rank tend to follow their economic rank in the village community". This correlation between castes and the productive organization has led many authors to argue that caste was a form of class in the Marxist sense. Nevertheless, this interpretation is much disputed on many grounds and one of them is the imperfect correlation between status and wealth. In his study of a Tanjore village, Beteille (1974) also observed this imperfect yet quite strong correlation. Upper castes own the majority of land and even found ways to escape acts passed that aimed at redistributing land. Nevertheless, he argued that as modernization of the economy progressed, upper castes found opportunities in the new sectors being developed and thanks to a relatively high level of education moved to urban areas. Thus local economic power in rural areas was somehow transferred to middle castes. This is the reason why, middle castes may be found to be more dominant than upper ones at the local level.

The process of *Sanskritization* also stresses the flexibility of the system and the relative importance of wealth in the caste structure. Srinivas (1952) who coined the term writes "the caste system is far from a rigid system in which the position of each component caste is fixed for all time. Movement has always been possible, and especially in the middle regions of the hierarchy. A caste was able, in a generation or two, to rise to a higher position in the hierarchy by adopting vegetarianism and

teetotalism, and by Sanskritizing its ritual and pantheon. In short, it took over, as far as possible, the customs, rites, and beliefs of the Brahmins, and adoption of the Brahminic way of life by a low caste seems to have been frequent, though theoretically forbidden. This process has been called *Sanskritization*". Many observers have added that such a *Sanskritization* process was concurrent with an increase in the group or sub-group wealth. Thus, a group becomes wealthier, it endeavors and sometimes succeed in raising its status. This, again, suggest that status power or wealth are not independent.

To sum up, there are three features that make a caste dominant : population, control over land, and ritual status (as well as education although to a lesser extent). A perfect match between the three is seldom observed, and their distributions may change over time. These probably are the reasons why a clear answer to the question asked at the outset of this section can not be given. Nevertheless, please bear in mind that, although not perfect, the correlation between these three features is relatively high.

The aim of this section was to, if not define, at least characterize castes through five main features and to get a better understanding of their backgrounds. This led us through a historical detour whose main purpose was to present some notions that underlie the caste ideology and whose effects are still largely felt today, as well as to highlight the centrality of ritual purity. Building on the latter we were able to better trace the form of untouchability. This will prove quite useful in Chapter 2 where it is shown that, despite the diversification of untouchables' economic situations, caste remains a strong predictor of perceived social class. The counterpart of purity that is ritual pollution is also fundamental to sense why some castes and most notably untouchables are prevented from accessing public goods, which is the point made in both Chapters 3 and 4. All the elements necessary to the understanding of Chapters 2, 3 and 4 are thus gathered. All that remains is a synopsis of the various theories about the origins of castes, given that we rely on some of them to develop a model of social distance in Chapter 1.

1.2 Theories About The Origins of Castes

There is no consensus about the origins of caste, largely due to the scarcity of historical records. However, theories may be grouped in two families. The first one looks into history, as little documented as the concerned period is, while the second builds on the documented characteristics of the institution to infer the potential functions of caste in the political or economic arenas. Not surprisingly, the first family insists on the ideology that underlies castes while the second emphasizes its functioning. Both families will be reviewed alternatively[17].

[17]This section follows quite closely the presentation and the arguments made in Klass (2004) for this author provides a very comprehensive view of all competing theories. Yet, from time to time I allow myself to comment on some of the points he makes

1.2.1 The "Purity of Descent" Theory

"Attempts have been made [...] to derive the caste system from the presumed social system of invading 'Aryans'. For Hindus, that system had a divine origin and sanction. Some scholars [...] have concluded that the system developed in the period just after the 'Aryan invasion', as a response to circumstances of that invasion and the resulting confrontation of 'races'"(Klass, 2004). This is the theory that will be investigated below.

As already mentioned, there is strong evidence that a population called Aryans settled in the sub-continent around the first millennium B.C. They brought along the Vedic religion based on sacred texts the *Vedas*. One of the latter, the *Rig-Veda* distinguishes between *Arya Varna* and *Dasa Varna*. In Sanskrit, *dasa* used to have the primary meaning of enemy and later acquired the connotation of servant or slave. In the *Rig Veda* the word *dasa* occurs sometimes in conjunction with the term black. *Varna* meaning color in Sanskrit, some specialists consider that this distinction between *Arya Varna* and *Dasa Varna* was made to separate the fair skin invaders form the darker skin natives. Deliège (2004) outlined the view of the renowned Indian sociologist Ghurye who believed that Aryans had already ascribed a degree of ritual purity and exclusivity rules to these groups. Moreover, the laws of Manu that describe the four *varnas*, also mention the the *Chandalas*, the lowest of the low men, whose moral degradation is complete and who are to be humiliated. Because, *Chandalas* are rarely mentioned in sacred texts they are usually not considered part of the system of castes. Although the Laws of Manu describe them as individuals who broke the code (for instance the offsprings of forbidden marriages), some authors think of the *Chandalas* as being the natives, the non Aryans[18]. Because their religion was not *Vedism* or its later form, *Brahminism*, they were considered being outside the system of castes and therefore looked down upon.

The distinctions made in sacred texts combined with the centrality of the concept of purity, led many scientists to believe that earlier versions of castes and the attached endogamous rules came out of a concern from the conquerors to maintain the purity of blood. This theory found an echo in the common belief in India that having a fair complexion is a sign of distinction and that Brahmins in general do have fair complexions.[19]. As Klass (2004) summarizes "let us note at the outset that it is surely one of the most commonly held explanations in India, as well as in Europe and the United States. In sum, the position is taken that the original *varnas* were racial categories, set up to maintain 'purity of blood' with many, if not all, of the present castes deriving, in their common rule of marital exclusivity as well as in their particular positions in the hierarchy, from attitudes towards 'racial' intermarriage in the Vedic period". He later adds "this explanation of caste origin, surely the most widely accepted and most influential of all explanations".

[18]Many tribes call themselves "adivasis" which can be translated as "original habitants of the land" in reference to the theory that sees them as the descendants of the *Chandalas*. It is dubious that one may trace back tribes' origins up to two millennia ago and it should be stressed that this label is fraught with political claims

[19]this is a remark made by Beteille (1965) in his study of a Tanjore village. Please note that it is the perception people have, albeit it may not be actual

Although the most common theory, Klass (2004) argues that it has major inconsistencies. First, the theory assumes that color refers to skin color whereas it could be symbolic. For instance, the color of the *Khsatriyas* or warriors is the red according to ancient texts, much in the same manner that red was the color of the Emperor in ancient Rome as it symbolizes martial virtues. Second, we lack historical evidence about the physical traits of the two populations and more importantly about the fact that there may have been strong differences between the two. Klass (2004) is probably right in saying that we have no evidence of this, yet it is likely that the physical traits of Caucasian Aryans and of South East Asian may have been different. Third, "the mere fact of conquest [...] is no proof in itself that conquerors will hold aloof from intermarriage with the conquered[20]". This would be convincing if we did not have a set of arguments, although disputable, coming from the *Vedas* and later texts themselves, that suggests the contrary, as explained earlier. Fourth, the Aryan conquest has been envisaged by the advocates of the "purity of descent" explanation as a civilizing process led by the Aryan "gentleman" of the barbarians natives. Yet, whether this was a conquest is still debated. It might have been progressive relatively pacific settlements. Second, it is quite likely that the populations the Aryan met during their "invasion" were from the Indus civilization, and were anything but anarchic "uncivilized" hordes of barbarians.
Fair enough, but whatever the hypothesis about the level of achievement of the two civilizations, the settlement of the Aryans in the sub-continent nevertheless occurred. Whether they brutally conquered the land or pacifically settled down does not necessarily entail that they might not have wanted to rule out intermarriages with the "natives". One may argue that given the success of the Aryan conceptual framework and religion, the debate about whether they conquered or settled down is useless, given that, at the end, the Aryan civilization dominated and given this domination they did not want to mix with the locals and thus set up the an initial form of castes. This makes sense, unless we question the supposed "continuity [...] between the religion of the people of the Vedas and the belief system of the contemporary Hindus of India. For some, particularly for many Hindus, it is in fact the same religion - modified perhaps, evolved, or even degenerated, but not different. The suggestion, therefore, that Hinduism derives to an important extent not only from the Vedic peoples but also from the earlier, indigenous inhabitants might come as a shock to some - but not, of course, to Indologists[21]".

In summary, the Aryan invasion theory is the most common held view about the origin of castes, although it still has some dark sides and can be challenged on various grounds. Nevertheless it acquainted us with the Aryan invasion and the fact that segregation might have resulted from such a conquest, a story to which we shall come back in Chapter 1.

[20]Klass (2004)
[21]Klass (2004)

1.2.2 Castes as Religious Guilds

Some theorists attempted to extricate the origins of castes out of the "Aryan-Dasyu" confrontations. While the latter mainly focused on endogamy, the former stress the occupational specialization of castes. The theories hypothesize that castes derive from occupational associations comparable to "guilds", which for various reasons became transformed into endogamous groups. Furthermore, in short, it states that India, probably like any place in the world, was populated by tribes whose *raison d'etre* was common ancestry. Then, at a later stage of development groups became specialized and tribes collapsed. Yet, membership to these groups was not hereditary at this time but later became so for various reasons including one invoked by some theorists that at some point, Brahmins restricted access to priesthood to their own children "in an effort to preserve for all their descendants the perquisites and privileges of their occupation[22]". Given that Brahmins set the example, other occupational groups followed the same path and the resulting society was a collection of hereditary occupational groups, i.e. castes. According to this view, castes stem from the particular power of influence of the Brahmins. This view is summarized by Maine (1887) "caste is merely a name for trade or occupation, and the sole tangible effect of the Brahminical theory is that it creates a religious sanction for what is really a primitive and natural distribution of classes"[23]. Klass (2004) argued that this occupational interpretation of castes does not hold against factual evidence. First, occupation is not, in his view the most salient feature of the system and he is probably right given that, as we have seen, traditional and actual occupations are nowadays uncorrelated, while caste still remains a reality. Second, he argues that the "entry of the members into new occupations is rarely the occasion for expulsion from the marriage group[24]. Some men might be expelled because the occupation being followed was repulsive to the rest of the group, and others might separate themselves [..] perhaps because because they believed their new occupation placed them above their fellows". Klass' argument however is somewhat disconcerting for he compares relatively recent accounts of caste fission to what might have happened centuries ago, thereby giving the impression that caste has not changed over time. However, the lack of convergence between actual and traditional occupations, particularly centuries ago when agricultural production was the main activity probably proves him right in his saying that occupational specialization should not be taken as the foremost feature of caste.

A last theory worth mentioning in that vein is that of Sénart (1978). Sénart builds both on the "guild" arguments and on the racial antipathy theory. It probably is best summarized in the following excerpt "Nowhere in antiquity have the Indo-Europeans shown any great taste for manual professions. The Greeks and the Romans left them to slaves or intermediate classes, freedmen and members of the household. The Aryans, settled in villages and at first completely pastoral in occupation, had even less need to follow them in India than elsewhere. Manual labor was destined in general to remain the lot of either the aborigines or of the peoples whose hybrid or doubtful origins related them to the same level. Both these groups,

[22]Klass (2004)
[23]cited by Klass (2004)
[24]Klass (2004) prefers marriage-group to the term caste

in becoming artisans, brought with them their tradition and the desire to be assimilated to the analogous organization of the superior race". In brief he builds on both theories by saying that invading Aryans already endeavored to separate themselves from indigenes and people with "doubtful origins". Given their reluctance towards manual work, they relegated it to non-Aryans. The set of occupations for Aryans was therefore non manual and within that set, the priests emerged as the dominant social and occupational group and restricted access to their group to their own children. They now constitute a caste that other groups would eventually copy. One could say that the same counterargument as the one used against tenants of the occupational explanation could be applied to Sénart (1978). My sentiment is that by subordinating the occupational specialization to the power gained by the Brahmins and to endogamy, his theory may have overcome elements that appeared dubious in the "guild" theories.

1.2.3 Castes Functions as Their Origins

The above mentioned theories have three drawbacks according to Klass (2004). First, Brahmins and their power are central to these explanations. Yet it is unlikely, Klass (2004) argues that such a pervasive institution has been imposed by one group on the others. Second, the absence of historical records confine these explanations to the rank of hypothesis, not to say speculations. Third, it places too much emphasis on the religious aspects of castes, when the system may be viewed as a political or economic organization, whose sanction was religious. Therefore another valuable approach would be to investigate what caste is and how the system works to infer its function and look into its origins.

These theories fall within the functionalist views on institutions. They rest on the hypothesis that no social organism may last in time if one of its constituting institution is massively dysfunctional, thus institutions, such as the caste system must have or had a function. The theory developed by Baechler (1988) may be placed in this category. Briefly said, this author asserts that kingdoms or empires in India did not manage to provide society with coherence and cohesion. It seems that Indian polities lacked consistency, were instable, short-lived as testified by the absence of dynastic continuity. Indian rulers failed to implement a local political organization, contrary for instance to the Chinese state, whose bureaucracy extended to the very local level. In Baechler's word, the political arena was discredited. This posed a threat to the Indian social body that replied by forming *jatis* as a way to organize villages' lives. This theory, unfortunately too briefly summarized, finds an echo in the way caste used to, and in some instances still do, rule communities' lives, through caste assemblies.

While Baechler's theory emphasized the political origin of castes, others have insisted on their economic functions. These set of theories builds on Polanyi's substantivist approach, in the sense that they insist on the influence over economic behaviors and organizations exerted by the relationships with individuals' natural environments and patterns of interactions. The latter are of three types "Empirically, we find the main patterns to be reciprocity, redistribution and exchange. Reciprocity denotes movements between correlative points of symmetrical groupings ; redistri-

bution designates appropriational movements towards a center and out of it again ; exchange refers here to vice-versa movements taking place as between 'hands' under a market system. Reciprocity, then, assumes for a background symmetrically arranged groupings ; redistribution is dependent upon the presence of some measure of centricity in the group ; exchange in order to produce integration requires a system of price-making markets. It is apparent that the different patterns of integration assume definite institutional supports" (Polanyi, 1957). Now where does the caste system fit in this classification ? The *jajmani* system was briefly described as an exchange of labor, services or goods between relatively specialized castes for a share of the harvest. Yet the amount of the "exchange" was fixed by tradition and obligations to provide the services were inherited. Money would not be exchanged. In short this was not a marketplace which prevents from fitting caste relationships in the exchange category as defined by Polanyi (1957). Second, in the *jajmani* system certain castes, such as that of priests among others, often excluded from the exchange low-ranked castes. Thus relationships can not be called reciprocal. We are then left with redistribution. Gough (1955)[25] provides an account of the set up of a village in Tanjore named Kumbapettai. According to the author, the Maratha Raja, willing to set up a village, offered land to four families belonging to a Brahmin sub-caste. Apparently, the land was divided into four equivalent parts that were rotated every three years. They did not, strictly speaking own the land, given that they had no rights to dispose of it to outsiders, but they and their descendants enjoyed the usufruct as long as the Raja received a major share of the harvest. The remaining part of the harvest was the propriety of the four Brahmin families. The Brahmins soon "acquired" families to perform the agricultural work that themselves were forbidden to do. They provided them with construction materials, a garden and the right to fish in village's bathing pool as well as gifts at marriages, festivals and death. Men performed various tasks from planting, growing and harvesting the crop, to attending to the Brahmin's cattle, while women would clean the houses' of their husbands masters. In exchange for these services, men were given by their masters a fixed quantity of paddy each month while women and boys received a smaller amount. The bottom line is that Brahmins directed and supervised the agricultural production, administered the affairs of the village and were also granted by government the supervision of public goods production and of justice. They were the center for redistribution. In this instance, they were the Brahmins, but they may have come from other castes. The important point is "the work of all of these castes was performed primarily on behalf, and under the authority, of the landlords whose villages they served" (Gough, 1955). This story of Kumbapettai stresses the importance of land ownership that is a major factor in the definition of a dominant caste given by Srinivas (1955). This is where this theory rejoins that of Baechler (1988). The institution of caste was a redistributive exchange system where the dominant caste controls both agricultural production and the allocation of services, under the relatively weak authority of the government. The absence of political authority was compensated through an economic system that transformed the dominant caste into a political center.

[25] quoted by Klass (2004)

1.2.4 Summary and Relationship to Power

At this point I somewhat feel compelled to ask for the reader's forgiveness for such a long account of the origins of castes. Yet, I have insisted on presenting all these views for three reasons. First, these theories clearly stress that caste is a multi-faceted and complex phenomenon. Caste is both a religious, economic and political phenomenon and is not exempt from the influence of historical events. Second, some of the anthropological debates on the origins of social institutions and norms finds an echo in the way economics has progressively integrated these social elements. This point will be developed in section 2.1.6. Finally, as I have already mentioned, some of these theories served as a starting point for the elaboration of a model of segregation that will be developed in Chapter 1.

Indeed, in this chapter, segregation is envisaged as resulting from the fact that one group has the capacity to offer benefits to others that would otherwise be unattainable. This is how power is defined in Chapter 1, although I must admit that this concept is rather ambiguous and multi-faceted. What I call power some may name it influence. Political scientists usually hold to the word power and distinguish between "power of injunction" and "power of influence". The table below is an excerpt from a political science textbook (Braud, 1985) that summarizes the difference between the two[26] :

Kinds of power	**Ways of exercise**	**Potential sanctions**	**Effectiveness warranties**
Injunction			
	"Legal" norm	Negative sanctions (punishment)	Material coercion
	Moral prescription	Inflict a a material or symbolic penalty that will alter the subject's initial situation	Psychic coercion (whether real or perceived)
Influence			
	Persuasion	Positive sanctions (rewards)	No coercion
	Manipulation	Access to information	
	Authority	Material or symbolic reward	

Thus the definition of power given in Chapter 1 relates to a power of influence. Moreover, Raven and French (1958) define five basis for social power[27] : "*reward power*, based on the perception by the individual, P, that the agent, O, can mediate rewards for him ; *coercive power*, based on P's perception that O has the ability to mediate punishments for him ; *legitimate power*, based on the perception by P that O has a legitimate right to prescribe behavior for him ; *referent power*, based on P's identification with O ; and *expert power*, based on P's perception that O has some special knowledge or expertise". The definition given to power in Chapter 1 is precisely what Raven and French (1958) call "reward power".

[26]Translation may be approximate as it is mine

[27]Social power is already a sort of sub-category of the notion of power. It should be understood as the ability to influence others by changing their real or perceived incentives. Thus it is quite close to the power of influence described in the table.

Why can it be argued that, in the case of castes, one group had "reward power" over others ? Please recall that in the Vedic period the priests monopolized sacrifices, whose importance was crucial in worldly success. They were the only ones who had access to the deities and divine protections could only be acquired through the intercession of the sacrificers. In this sense, the Brahmins were controlling access to spiritual and the resulting material benefits.

In the same vein, the Aryan domination, is likely to have entailed a power grab, and whether this was political through military supremacy, or land control or spiritual is not discussed here. And it may have very well resulted, the "purity of descent" story tells us, in attempts to separate from the dominated natives. Sénart (1978) precisely makes this point when he says that the caste system arose from a reluctance by one group to perform manual tasks. And if this group was able to confine those tasks to a different one, it is because they, in a way or another, dominated the other one. Although, as previously said, the "purity of descent" theory may be challenged on different grounds, it remains the most widespread and influential explanation of the theory of caste. Even if one does not subscribe to this theory, sacred texts on castes, clearly stress the influence one group, the priests, had over others.

Let's assume that the explanation of castes in religious or historical terms is not satisfactory and that we may prefer to turn to the functional role of castes. The description of castes as an economic redistributive center highlight that other castes did actually depend for their livelihood on the land owning caste, who, more often than not, were Brahmins. Such a system placed the landowning caste as both the economic center but also the political one. This description stresses the "reward power" the landowning caste had. It could be objected that such a power may have been a consequence of the caste system and as such it resulted from an already operative segregation. Thus, the views expressed in Chapter 1 that segregation may originate from a power capture should be reversed. Yet, I would argue that since we lack evidence on what preceded what, both points of views are conceivable. However, the Kumbapettai account and the *zamindari*[28] system under British rule, let us believe that the powers granted to the landowning castes have resulted in deeper castes cleavages.

1.3 Caste Flexibility and Recent Transformations

This search for the origins of castes as well as the presentation of the sacred texts should not lead us to believe that caste has not changed over time and that it is anything but flexible. I have already mentioned that caste is not independent from wealth and power. There has been many castes fissions, generally due to an increasingly heterogenous economic status within a group. There has been fusions as well, prompted by various factors ranging from wealth levels to political interests and so on. Caste is far from being the rigid institution people usually have in mind and given this flexibility it must have largely changed over time. Some authors such

[28]In Kumbapettai, the Raja turned over land to few families to collect more efficiently taxes. The British resorted to a similar system, when they ascribed to the existing *zamindars* a tax collection duty. This system if often viewed as having deepened castes cleavages.

as Bayly (2001) argues that the British Raj reinforced its rigidity. She argues that what is now viewed as the traditional institution and ideology underlying castes, only took shape at the beginning of the XVIIIth century "that is, the period of rapid regional state-building which accompanied the collapse of Mughal rule and the expansion of Western power in the subcontinent". Other authors such as Dehejia and Dehejia (1993) argue that the caste system in India was quite flexible until the Medieval Times when land or crop granting replaced cash salaries. The caste system has undergone deep transformations. For instance, the *jajmani* system has nearly disappeared. The increasing access to primary education as well as the development of new economic sectors besides agricultural ones might have lowered the correlation between caste and wealth. Yet, many authors such as Banerjee and Knight (1985) or Borooah (2005) have evidenced and measured caste-based discrimination, thereby showing that it is still a reality and not only in rural settings. In Chapter 3 we also present some evidence that untouchability practices have not disappeared. Thus even if the caste system has been largely altered, some of its aspects remain.

Among the recent transformations that are worth mentioning, one should be looked into more details, as it may have had repercussion both on the functions of castes and on the data available and those used in this dissertation[29]. The Constitution of India both outlawed caste based discrimination and set up reservations policies for both Scheduled Castes and Scheduled Tribes. Yet, the Constitution also envisaged extending these policies to "other backward classes" ("OBCs"), that, roughly speaking, were low non untouchable castes. In 1953 a commission was set up to identify this group. It proposed to extend reservations to about 2,000 castes identified as OBCs. The government rejected the proposal on the ground that the list rested too much on caste as criteria for social backwardness, at a time when it championed a universalist conception of the Indian citizen. In the meantime, the identified OBCs became conscious of the value of being on the list and of benefiting from reservations. Under their pressure another commission was set up named after its president B.P. Mandal. The commission identified 52% of the population as OBCs and recommended reserving 27% of the administrative positions to them. Higher castes reacted violently and recommendations were not applied nationwide. In reaction OBCs mobilized politically and caste, in a broader sense than that of *jati*, emerged as a political identity. Thus, according to Jaffrelot (2002), caste in India has become a political rally.

This classification as SCs, STs, or OBCs has very a very practical consequence. All the statistical information gathered has been adapted to this new classification. Given that OBCs is not an officially recognized group and that there is a debate about who is in and who is out as well as the size of the group, only few data sets would classify households as OBCs. Most information on caste would come under the categories of SCs, STs and non scheduled. Arguably, this is an over-simplification as each group encompasses very heterogenous castes. For instance, as the debate over OBCs has shown, situations may be very heterogenous within the non-scheduled group ranging from very low castes to Brahmins. Nevertheless, authors of empirical work have little choice but to follow the way data are informed.

[29]The account that follows is based on Jaffrelot (2002)

Now that foundations have been laid for the comprehension of the nature and potential origins of caste that will prove necessary in the following chapters, we may turn back to the initial question : "what do castes have to do with economics ?".

2 How is The Study of Castes Relevant to Economics

There are three families of arguments to answer this question. The first one deals with the conceptual framework used in economics. As Becker and Murphy (2003) write "modern economics, whether in textbooks or in the most advanced journal articles, typically assumes that individual behavior is not *directly* influenced by the actions of others. Of course, it is understood that every individual is greatly affected *indirectly* [...] Presumably for this reason, anthropologists and sociologists have repeatedly told economists about the importance of culture, norms and social structure. Economists have not listened, however, mainly because these other fields have not developed powerful techniques for analyzing social influences on behavior". The rational self-interested maximizing agent, the *Homo Economicus* was not much considered in his environment. Yet, experiments have shown that norms, culture and values play a great role in decisions or preferences. Thus Ostrom and Ahn (2003) write "abundant anomalies accumulated that called for careful examination of the factors that were left out of earlier theories. Some of the puzzles [...] could not be answered satisfactorily without seriously studying the omitted factors : trust and norms of reciprocity, networks and forms of civic engagement, and both formal and informal institutions". This set of arguments will be detailed in section 2.1.

The second family refers to the purpose of what was once called political economy, which can be described, with a bit of simplification as the maximization of welfare in a society. Failing to account for the limitations imposed by the individuals social condition on their ambitions or functionings, as per A. Sen's words, would put the analyst in the grip of the criticism addressed by this author to welfarism. This will be discussed in section 2.2.

Finally the last set or arguments relates to the economic instruments that are chiefly markets. Because social structures may create large transaction costs or alter preferences, they impede the efficient allocation of resources. Suppose, for the sake of the argument, that perfect and fluid markets are a prerequisite of growth and economic development. Then employment discrimination should be studied not only because it reduces individuals *capabilities* and is unethical (such a study would be related to the purpose of political economy) but also because it prevents efficient allocation of labor (the instrument of political economy). The same goes with social norms or institutions in general and castes in particular. They ought to be studied because they influence the attainment of policy objectives but also the means of achieving such objectives. Examples of how castes do interfere with the economic instruments will be evoked in section 2.3.

Before delving into this matter, let me give here a couple of definitions of conceptually very close terms that will be extensively used, namely social institution, social identity and social norm. Social institution should be understood in a sociological sense that is a system of social relationships that is relatively stable in time. It implies groupings that, once formed, immediately prompt the formation of social identity, at least this is what the results from behavioral experiments suggest. Social identity can be defined as a "person's sense of self"[30] as a member of a group. Social institution can be said to be a determinant of social identity. Moreover, both social relationships and social groupings imply the creation of norms. Presumably, as soon as groups are formed, codes are be set up to secure both social identity, cooperation within the group and to structure relationships with other groups. These three concepts are very close and their alternative use in what follows should not come as a surprise.

2.1 The Under-socialized *Homo Economuicus*

As pointed out at the beginning of this section, the conventional economic agent is isolated from his social environment. This is one of the strongest criticism addressed by other social sciences, chiefly sociology, to economics. While the *Homo Economicus* is mainly pulled by instrumental rationality, the *Homo Sociologicus* is mainly pushed by social norms and institutions as well as social pressure. For instance, Durkheim and its followers insisted on viewing economic behavior as a "social fact" i.e. a way of "acting, thinking and feeling external to the individual, which are invested with a coercive power by virtue of which they exercise control over him"(Durkheim, 1895). Sociology stresses the primacy of social relationships. This can hardly be more opposite to the conventional view held in economics of behaviors driven by self-interest based on exogenous preferences and that through unlimited information and instrumental rationality, maximize utility under the constraint of scarce of means. The *Homo Economicus* is a self-regarding consequentialist rather than a "political animal" as per Aristotle's words. However, all these characteristics have come under scrutiny impelled by (a) the criticisms addressed by other social sciences, (b) the regain of interest for earlier theories that either contested one or more of the characteristics attributed to *Homo Economicus* such as A. Marshall (Bowles and Gintis, 2000) or insisted on the role of institutions such as J. Schumpeter and T. Veblen and (c) the accumulation of "abundant anomalies" as per Ostrom and Ahn (2003) words. Among such anomalies, two are worth mentioning, collective action and discrimination, since they will serve as a thread for the arguments developed in the chapters. Indeed early theories of collective action (Olson, 1965) concluded that agents left by themselves in a situation where free riding is an option, can not achieve cooperation unless incentives are modified by an external authority. Similarly, how come that individuals who are identical in all their characteristics but skin color do not earn the same wage ? As mentioned by Ostrom and Ahn (2003) these analysis clearly point at the role of social interactions and norms.

[30] Akerlof and Kranton (2000)

Naturally the last point leads us to the work undertook by Becker (1976) and to whom we must pay a tribute for reintroducing social relationships in economic behaviors. Yet, his analysis probably did not go far enough as the behaviors he described are dependent upon set roles that are exogenously ascribed. As Granovetter (1985) argued "Actors' behavior results from their named role positions and role sets ; thus we have arguments of how workers and supervisors, husbands and wives or criminals and law enforcers will interact with one another, but these relations are not assumed to have individualized context beyond that given by their named roles". Becker's explanation of discrimination in the labor market through an exogenous "taste for discrimination" immediately prompts the question of the origin of such a taste and points towards the necessity to bring social norms and institutions in the picture.

2.1.1 Instrumental Rationality

This is where new institutional economics came in by refuting the assumption of costless information and insisting on asymmetrical information and transaction costs. As North (1995) writes "in fact, information is incomplete and there is limited mental capacity by which to process information. Human beings, in consequence, impose constraints on human interaction in order to structure exchange. There is no implication that the consequent institutions are efficient. In such a world ideas and ideologies play a major role in choices and transaction costs result in imperfect markets. The place to begin a theory of institutions, therefore, is with a modification of the instrumental rationality assumption". Instrumental rationality assumption was modified indeed, rather than swept away for, in this framework, agents still resort to an optimization of the ends under the constraints of scarce means, given information available to them. Thus out of the characteristics attributed to the neoclassical agent that are self interest, exogenous preferences, instrumental rationality with complete information, only the last one was contested, yet without refuting the consequentialist behaviors of agents. Therefore, institutional economics may come under the grip of three kinds of criticism. First, are the retained hypothesis about agents behaviors acceptable ? Second, if ideologies and norms are the tools agents resort to in case of information scarcity, where do they come from ? Going back to the discrimination example cited above, the theory moved from Becker's taste for discrimination to Arrow (1971) statistical discrimination. Agents resorts to discrimination to compensate for the lack of information about their future employees productivity. Thus the norm is a palliative to a lack of information. I argue in Chapter 1 that this prompts a similar question to that raised by Becker (1957) theory : where does the inference about someone's productivity from physical or social traits come from ? In other words, where do prejudice come from ?

Let's turn first to the first question, that is the validity of the characteristics ascribed to agents. Are they consequentialists in the sense that they optimize their utility given a scarcity of means ? Two types of answers have been brought forward mostly based on the distinction made by Polanyi (1957) between the "formal" and "substantive" meanings of economics : "the substantive meaning of economic derives from man's dependence for his living upon nature and his fellows. It refers to the interchange with his natural and social environment, in so far as this results in supplying him with the means of material want satisfaction. The formal meaning

of economic derives from the logical character of the means-ends relationship, as apparent in such words as "economical" or "economizing". It refers to a definite situation of choice, namely, that between the different uses of means induced by an insufficiency of those means. If we call the rules governing choice of means the logic of rational action, then we may denote this variant of logic, with an improvised term, as formal economics. The two root meaning of "economic", the substantive and the formal, have nothing in common. The latter derives from logic, the former from fact. The formal meaning implies a set of rules referring to choice between the alternative uses of insufficient means. The substantive meaning implies neither choice nor insufficiency of means : man's livelihood may or may not involve the necessity of choice and, if choice there be, it need not be induced by the limiting effect of scarcity of means...". The reason for quoting Polanyi (1957) at such length is that the distinction he made had enormous implications in social sciences and most prominently in economic anthropology. Surprisingly, the cleavage created between "formalists" and "substantivists" was confined to anthropology. This may be due to the fact that susbstantivists challenge the hypothesis that all actions derive from deliberate choice, which is central to most economic models.

2.1.2 Freedom of Choice

However, when economists start introducing social interactions to explain the puzzles Ostrom and Ahn (2003) were referring to, choice appears much more limited than what conventional models assume and this seems to be troubling Becker and Murphy (2003) when they write "strong complementarities between social capital and individual behavior appear to leave little room for individual choice. Although at one level there is much validity to these claims, at a more fundamental level social capital changes the focus rather than reduces the importance of individual choice. If peer pressure and other forms of social capital have enormous power over choices, it becomes much more important to make wise decisions in selecting peers and other determinants of such capital". In the model derived by Becker and Murphy (2003) the only space for rational choice is the decision to associate with others."Even when social structure and social capital have enormous power over behavior, people still greatly influence their behavior by, in effect, choosing their social capital [...] We believe that utility maximization and other parts of rational choice theory provide insight into how people are divided into different categories when some categories are in greater demand because they have more attractive members. That is, we hope to demonstrate that rational choice theory is not inconsistent with the importance of social structure, but rather is crucial in understanding how this structure gets determined". Yet, many instances prove that the freedom to choose social capital is rather limited. In highly stratified or ethnically fragmented societies, social capital is probably imposed on individuals by birth or physical traits. Given what has been said before about the system of castes, it would take a lot of energy to show that individuals are entirely free to choose their social capital within this context. Arguably, even in socially mobile societies the extent of social capital that one is able to acquire may often be thought as given, owing to the fact that habits are taken in

the community, norms are inculcated early in the childhood, etc[31].

2.1.3 Embeddedness and Social Interactions

What is clear from this abstract is that economists are ill at ease when too much emphasis is put on social relationships, norms and institutions. However, since the argument made by Granovetter (1985) that "most behavior is closely embedded in networks of interpersonal relations and that such an argument avoids the extremes of under- and over-socialized views of human action" a middle path seems to have emerged. Rather than positing the absence of relationships between desired outcomes and scarce means, or the absence of interferences by social relationships in behaviors, recognizing that behaviors are embedded into social relationships leads to considering strategic interactions. This is a point made in Akerlof (1976) about castes, when the author asks why virtually no one would break the caste code, when the disappearance of castes would make everyone better off. He answers that the expectation of being out-casted if the individual was to break the code, would make him much worse off than obeying the code. Thus everyone obeys the caste code, even though everybody would be better off without it. Similarly Basu (1986) recalls what Vaclav Havel wrote about "dictatorships in which no one or no group plays the role of dictator. Each citizen, from fear of being labeled disloyal and being harassed, conforms to the rule of the system. Even those who harass do so because they are worried that if they do not harass the disloyal, they themselves may be labeled disloyal. So each individual through his own little rational acts help sustain a regime which he might not actually want"(Basu, 1986).

Behaviors are thus considered in terms of strategic relationships. Yet this is not sufficient to explain "Why do we not try to walk off without paying after a taxi ride ?" (Basu, 1997). This author argues that it cannot be explained by pure selfishness but rather by obedience to norms of fairness. Walking away is not in the agent's set of actions, because norms exclude certain behaviors[32] As Basu (1997) writes "It is obvious, at least to most of us, that much of human behavior is shaped by morals, customs, and social norms. What is less obvious is that an individual's adherence to certain social norms may be a necessary element in many economic models". Behavioral experiments concur on the fact that norms restrict the set of possible actions. Dictator's games rarely yield the outcome that would be expected under the assumption of selfishness and utility maximization. For instance, Hoffman

[31]Please refer to Bowles (1973) and Bowles et al. (2009)

[32]I need to clarify the relationship between norms and preferences. Basu (1986) argues that norms restrict the set of feasible actions. Thus preferences are likely to lie within the the feasible set. Given that a behavior that would go against the norm is hardly conceivable, or all in all very costly, an individual would only weigh his options, i.e. express his preferences within the set of feasible actions. Let's take a rather crude example. A social norm may state that being more than 15 minutes late is extremely rude. Yet, I may choose to be five minutes earlier, if I like to come to an appointment first or only five minutes late. I still have expressed my preference within the boundaries of a socially acceptable set. Turning to the example of caste. The norm stipulates that one should marry within my group. Suppose an individual obeys a norm, he still can express his preferences in terms of partners within a group. This is discussed in more details in section 2.1.6 below

et al. (1996) conclude from dictator's game experiments that if subjects offer higher payments than predicted by the Nash equilibrium, even in one shot games, this is due to the habit of reciprocity, a social norm imported into the laboratory. Moreover, offers decrease with social distance during the experiment, suggesting that as the distance increases norm compliance loses strength. Henrich et al. (2001) studied the behaviors in ultimatum, public good and dictator games in 15 small scale societies. One of their conclusions is that predictions based on the self interested maximizing agent is not found in any of the society under study, while "the large variations across the different cultural groups suggest that preferences or expectations are affected by group-specific conditions, such as social institutions or cultural fairness norms"[33].

2.1.4 Other Regarding Preferences

Eckel and Gintis (2010) conclude "Experimental economics has found several very important cases in which the predictions of the self-regarding actor game theoretic model are incorrect, and the failures are due precisely to the violation of the assumption of self-regarding behavior". Another kick at the conventional *Homo Economicus* : preferences are not exogenous but rather situationally specific as Bowles and Gintis (2000) write "The primary contribution of the behavioral approach to economics is to understanding the diversity and context dependent nature of human preferences, how elements of this repertoire of preferences become salient in particular strategic interactions, how they have evolved over the long run, and how individuals form the beliefs that along with their preferences explain what they do. The behavioral approach is not a critique of optimizing subject to constraints. It takes for granted that people are purposeful and have reasons for what they do - although it recognizes that individuals may have internal conflicts and time-inconsistent preferences". An example of this, may be the analysis undertook by Voors et al. (n.d.) where the authors show that communities who experienced war in Burundi exhibit more altruistic and less patient behaviors.

Let's pause for a short time to briefly summarize what has been said so far. First, the instrumental rationality of the *Homo Economicus* has been challenged. Yet, limited or asymmetric information came to its rescue by saying that individuals do optimize subject to constraints, given the limited information available to them. Then the introduction of social institutions came as a reinforcement by stating that social norms do restrict the set of actions available and thus agents do optimize within that set, or by assuming that agents do make expectations about the repercussions of their actions on other who may backfire. The last two set of arguments build on the idea that behaviors are embedded into social relationships, but still maintain the selfishness of the agents. Yet, this last point has been challenged by behavioral experiments as observed outcomes rarely match the predicted Nash equilibria, due to the presence of concerns for fairness or the habit of reciprocity. It seems that agents are genuinely concerned with the effect of their actions on others. They have social preferences and may be less self-regarding than conventional mo-

[33]For a review of the outcomes in various experimental games, please refer to Bowles (2004)

dels would assume. Moreover, the impacts of such concerns are dependent upon perceived social distance (Hoffman et al., 1996). So preferences are likely not to be exogenous and rather context dependent. This last point seems to be confirmed by experiments on the formation of social identity.

2.1.5 The Impact of Social Identity

A number of experiments have shown that social identity influences behaviors (Steele and Aronson, 1995; Shih et al., 1999; Hoff and Pandey, 2006; Chen and Li, 2009). How is that so ? "Social identity is commonly defined as a person's sense of self derived from perceived membership in social groups"(Chen and Li, 2009). Moreover, the social identification process is often tied to the adherence to group's specific norms[34]. We may argue that any behavior that contradicts this sense of membership, or the group's code, jeopardizes part of the individual's identity and generates a feeling of discomfort, that is often referred to as "cognitive dissonance", a term coined by Festinger et al. (1956). Psychological experiments have shown that individuals experience anxiety while acting in a way that contradicts self perception and believes and that they endeavor to reduce this feeling of discomfort by either rationalizing their decisions or adapting their behaviors. Therefore, given that social identification is tied to stereotype formation (Tajfel et al., 1971), not acting in conformity to the stereotyped behavior contradicts social identity and thus creates anxiety. Let's consider the following examples to be more specific. Steele and Aronson (1995) conducted an experiment where they gave African-American and white students a test. The pool of subjects was separated into two random groups. One group was told that the test evaluated intellectual performance while the second group did not receive such a message. Performance of African-American in the first group was significantly worse. This under performance was due, the authors argued, to the conforming of race related stereotypes, what they called "stereotype threat". Another striking example is the experiment conducted by Shih et al. (1999). Asian American female undergraduates were grouped in three and given a math test. In one group, the Asian identity was emphasized. In a second the gender was stressed and in the control group no identity was particularly made salient. Results show that the first group outperformed and the second group under-performed compared to the control group. Thus women performance was altered by the stressed stereotype. There are a couple of other experiments of this sort and most evidence that individuals act in conformity with what others expect of them[35]. The one conducted by Hoff and Pandey (2006) is of particular interest. Children from Northern India were asked to solve mazes. When caste identity was not made salient, the performance

[34]One of the examples Akerlof and Kranton (2010) give is the enrollment of cadets at West Point. The aim of the training is to promote a military identity by stressing the differentiation between insiders (military) and outsiders (civilians). The adherence to a code of honor is supposed to reinforce the identification process. The authors write "In the formal language of social sciences, people divide themselves and others into social categories. And social categories and norms are automatically tied together : people in different social categories should behave differently. The norms also specify how people of different types - different social categories, in our new vocabulary- should treat each other."

[35]For an extensive review of these experiments please refer to either Akerlof and Kranton (2010) or Chen and Li (2009)

of both high castes and lower castes children were not very different. Yet, the lower castes performance dropped dramatically when caste membership was publicly announced. Thus long standing discrimination has shaped self perception and thereby reduced the most vulnerable group's set of expectations. This is what Bertrand et al. (2005) call "implicit discrimination". As individuals internalize norms and adhere to them, their social identity strongly influences their behaviors. Hence the necessity to introduce a utility derived from a compliance to the group's norms as done by Akerlof and Kranton (2000, 2005, 2010). They introduced as an argument in the individual utility function, a utility derived from identity and a gain or a loss in utility derived from complying to the norm or ideal set for or by the group the individual belongs to. The model thus captures the fact that behaviors depend on social category and on norms.

However, the impact of social identity may go beyond groups' norms and codes obedience as some authors argue that it modifies preferences. Experiments led by Tajfel et al. (1971); Tajfel and John (1979) show that even when groups are formed arbitrarily, subjects tend to identify with their group and such an identification begets intergroup rivalry and discriminatory practices. Chen and Li (2009) concluded that social identification modifies preferences in the sense that experiments participants exhibit more altruistic dispositions towards in-group members. Thus accounting for social identity stresses that preferences are context dependent and probably neither fixed nor exogenous. However, what is not clear in this literature is whether social identity modifies behaviors because it alters preferences or because it implies adherence to a code that restrict the set of possible actions. To be more specific, will individuals be more indulgent or generous towards their fellows because they feel a preference for them, or because to be part of the group, they have to adhere to an in group altruistic norm that makes selfish behaviors not an option.

2.1.6 What is a Social Norm ?

This is quite a difficult question and I will not attempt to settle it as this would largely be beyond the scope of the dissertation and rather presumptuous. However, it is surprising that that every set of theories mentioned so far, seem to have a different idea about the nature of norms. For instance, New Institutional Economics defines an institution as "rules of the game [..] humanly devised constraints that shape human interactions" (North, 1990). This definition is broad enough to include norms as informal rules of the game. They are viewed as a "humanly devised constraints" which suggests that they have a function and arise out of collective optimization[36]. A good example of this may be the prohibition of incest. However, Elster (1989) and Basu (1986) challenge this view on three grounds : first not all norms are Pareto-improvements. The study of castes by Akerlof (1976) clearly makes this point. Other authors such as Young (2007) describe norms as way to "coordinate people's expectations in interactions that possess multiple equilibria", a conception that is related to the former, although it departs from the idea that the equilibrium is necessary Pareto optimal. However, most of these views insist on norms being

[36]For a discussion on this particular point please refer to Elster (1989) or Anderson (2000)

imposed and sanctioned, while experiments on social identity showed that sanctions are not necessary for norms to be complied with. As Akerlof and Kranton (2010) put it "they [individuals] internalize the norms and adhere to them. This conception does not correspond to economists' usual view. To date, economists have mostly seen norms as sustained by external forces : people follow a norm because if they do not, they could be punished in some way". This last point insists on the fact that norms are not obeyed out of a fear of punishment, but rather because norms ought to be obeyed. They include a moral injunction. As in the example of the taxi ride given in Basu (1997), a taxi's passenger will pay for the ride not out of fear of getting into trouble with the taxi driver, but rather because he has to. This is what Basu (1986) calls "contract-adherence norms". Thus, according to this author, norms serve at restricting agents' action space. He writes "before asserting that an individual maximises utility, it is necessary to state clearly the domain over which the utility function is defined and the domain is not well-defined by uttering the magic word "everywhere". [...] The reason why in a formal general equilibrium model, an agent does not steal another agent's initial endowment is simply because such an act is not in his feasible set. [...]. This is where social norms become crucial. It is a method of policing individual activities without having to maintain a police force". A last definition of norms that is worth mentioning is related to social identity. It may be hypothesized that norms serve at reinforcing social identity, as the Cadet's code of honor reinforces a sense of membership to the Army. They may also serve at conveying information about the interacting partner.

The eclecticism of the answers presented so far is probably commensurate with the difficulty of answering the question about the origins of norms. This reminds of the debate about the origins of castes. It is much easier to identify how a system works and what its attributes are rather than how it came about. Moreover, it is very tempting to see in the attributes the origins, albeit nothing proves that because some features are relatively efficient they must be the cause of the system. Let's try to apply the above points of view to castes based norms. As Akerlof (1976) showed, castes can not be said to stem out of a collective optimization process. It may also be far fetched to see in such a very complex institution a mere coordination problem. How can we say that untouchability is a way to coordinate expectations ? Now turning to Basu's argument, caste based norms restrict the set of feasible action to police activities. This is not very far from the point made by Baechler (1988) presented in section 1.2.3. Yet, such an interpretation obliterates many aspects of castes. Thus the more suitable explanation is the one related to social identity, yet it is neither entirely satisfactory. If we assume that untouchability practices for instance aim at reinforcing social identity, which it probably does, this says nothing about why are low castes untouchables ? The point is that very few of the theories invoked so far leave room for ideologies, which is disturbing in the case of castes. We may thus have to turn to political science for an explanation and, as I will do in Chapter 1, to Weber (1978) concept of legitimacy, as the acceptance of an authority. The concept of legitimacy implies that people sees in this authority an accepted "rules of the game" as per D. North's words. Thus norms, may result from an already established situation. This is the assumption that supports the model developed in Chapter 1. Segregation may occur due to a specific political organization and segregation norms

are only a dress up for making the situation "legitimate" in the sense Weber gave to this word. Going back to the concept of cognitive dissonance, the social body may need an a posteriori rationalization of an already existing segregationist situation.

Let's leave the debate about the nature of norms aside for the time being. The points is that norms may have a large effect on behaviors and the necessity to account for them stands out clearly when practical issues are addressed. This is the point we make in Chapters 3 and 4 when we show that caste based norms, such as untouchability, have consequences on the way public goods are delivered and used. Unfortunately local norms or customs are seldom considered in economics, probably due to the universalist ambition of the discipline. This echoes the methodological criticism addressed by the followers of Durkheim to conventional economic models that were seen as deriving a set of actions from disputable behavioral assumptions, whereas facts should be the analysis starting point, as well as the distinction made by Polanyi (1957) between the substantive and formal meanings of economics. Hopefully the analysis conducted in the last two Chapters of the thesis make a convincing case for including local social institutions and norms within the ambit of economic analysis.

The consideration of social norms by the economic literature allowed to recast the *Homo economicus* as a political animal as per Aristotle's words and to challenge conventional assumptions to bring them closer to reality. "As economics evolved in the twentieth century, the models grew more sophisticated, but *Homo economicus* lagged behind.[...] Fairly recently, behavioral economics has introduced cognitive bias and other psychological findings. *Identity economics*[37], in its turn, brings in social context - with a new economic man and woman who resemble real people in real situations". Nevertheless, many questions remain unanswered such as that related to the emergence of norms or the identification process and assertion. The study of social organizations and norms, of which caste is hopefully an instructive example, allowed for this improvements, yet there still is much to be done. We may now turn to the second reason for studying the system of castes in economics that mainly rests on the arguments brought forward by A. Sen.

[37] *Identity Economics* is the title of the book by Akerlof and Kranton (2010)

2.2 A. Sen's Capabilities Approach

What was called in the XVIIIth century political economy and later became economics, was a normative theory of social arrangements. Utilitarianism imposed on political economy its framework and set as a criterion for a desirable social arrangement social welfare by the maximization of the individual utilities. A. Sen criticized the use of utility as a yardstick on many grounds, two of which are of particular interest to us : adaptative preferences and the focus on income as the argument for the utility function. He writes "a thoroughly deprived person, leading a very reduced life, might not appear to be badly off in terms of the mental metric of desire and its fulfilment, if the hardship is accepted with non grumbling resignation. In situations of long-standing deprivation, the victims do not go on grieving and lamenting all the time, and very often make great efforts to take pleasure in small mercies and to cut down personal desires to modest - "realistic" - proportions. Indeed in situations of adversity which the victims cannot individually change, *prudential reasoning* would suggest that the victims should concentrate their desires on those limited things that they can possibly achieve, rather than fruitlessly pining for what is unattainable. The extent of a person's deprivation, then, may not at all show up in the metric of desire fulfilment, even though he or she may be quite unable to be adequately nourished, decently clothed, minimally educated, and properly sheltered" (Sen, 1992). Because of the malleability of individuals expectations and mental states, even strikingly unfair states of facts may not result in dissatisfaction and as such would not be counted as unequal. Welfarism can thus result in highly unequal situations. Let's caricature by saying that if the utterly deprived are not dissatisfied, then all is for the best.

Moreover, the focus on income as the main argument of the utility function is also probably not appropriate given that there may be large variations in individuals capacities to transform income into well-being. As Sen (1992) puts it "even if the parameters of the conversion rates are respectively given , an equal distribution of income may yield very unequal well-being levels - with differences related to group specific parameters (such as gender, age, environments) and individual parameters (such as genetic characteristics)". Indeed many theoretical as well as empirical works[38] have shown that the relative income level matters almost as much as the absolute one in shaping well-being. Carlsson et al. (2009) showed in a study conducted in India that more than half of the marginal utility derived from income comes from some kind of relative income effects (what Sen called the group specific parameters). Moreover, the concern for relative income is positively related to low caste membership and a low level of family income. These authors also show that "an increase in the mean income of the caste to which the individual belong, everything else held constant, reduces utility for the individual". These studies put the emphasis on the fact that conversion rates of income into well-being is clearly dependent upon who the individual compares to, or, in short, his social identity. The differences in the relationship between income and well-being plead for the integration of social identity into the economic analysis, if we are to perceive social welfare as a function of individual well-being.

[38]By Blanchflower and Oswald (2004), Carlsson et al. (2007), Clark et al. (2008); Luttmer (2005), among others.

After having charged at the concept of utility, what kind of metric are we left with to assess well-being ? Sen proposes that of capability. Capability "represents the various combinations of functionings (beings and doings) that the person can achieve. Capability is, thus, a set of vectors of functionings, reflecting the person's freedom to lead one type of life or another. Just as the so-called 'budget set' in the commodity space represents a person's freedom to buy commodity bundles, the 'capability set' in the functioning space reflects the person's freedom to choose from possible livings" (Sen, 1992). If we retain the distribution of capabilities as the most relevant measure of inequality, we still need a lens through which the capabilities distribution is to be analyzed. Should we study the lack of freedom depending on age, gender, social class, geographical zones, individuals ? According to Sen (1992) inequality is probably best assessed in terms of groups and more particularly on those who experienced stable differentiation such as "class, gender, caste or community"(Sen, 1992). Besides Sen's suggestion, how do we know that caste is the appropriate dimension to study inequality ? Deshpande (2001) argues "poverty and inequality in India have been extensively researched, but the focus in economic research has been on identifying and defining the contours of poverty and redistributive policies that target the poor as a group. While this is undoubtedly essential, this has excluded the study of other ingredients of stratification, most notably caste, and precludes any inferences about intergroup disparity based upon caste". Sociological accounts presented in the previous sections of this introduction set us thinking that caste indeed is an important factor in the distribution of capabilities. Studies that empirically evidence the importance of castes in the analysis of inequality are few (Borooah, 2005; Deshpande, 2000b,a, 2001), yet they strikingly make a point for the integration of this institution. As Deshpande (2001) puts it caste should be seen as "an essential ingredient in the study of stratification patterns in India's population" and that "inter caste disparity continues to underlie overall disparity" (Deshpande, 2000a).

Now, how would social institutions such as that of caste have any effect on capability and functionings ? I would argue that there are two ways through which social groups may limit capabilities. The first one is related to the rules and behaviors imposed on other group members (prohibition to share water in the case of castes for instance). The second one works through social identity and the either collective or individual internalization of stereotypes and norms (as an outcast I should not envisage pursuing prestigious careers because (a) I will not be allowed to and (b) it is at odds with the way I picture myself). As far as the first point is concerned Shah et al. (2006) showed that even 50 years after the Constitution outlawed untouchability outcasts are often denied access to publicly provided goods and services such as entry into police stations, primary health centers, or access to public roads or water facilities. This particular point will be reviewed in more details in Chapters 3 and 4. Caste-based discrimination in the labor market is quite common and has been assessed, for instance, by Banerjee and Knight (1985) and Ito (2009). Caste based discrimination is pervasive and determines many aspects of economic opportunities from access to education, through wage or employment or even geographical settings. The list of channels through which castes reduce capabilities is probably

endless and these examples coupled with what has been said about caste rules and the prohibition of contacts should be convincing. For those who are accustomed to reading Indian local newspapers that abound with stories of inter caste clashes, often prompted by a willingness to enforce caste rules, saying that this social institution reduces capabilities and freedoms will probably appear a truism[39].

It could be argued that the limiting impact of castes on capabilities works also through a more subtle way than the imposition and the enforcement of rules by others. Social identity itself may limit the set of expectations and this more indirect route has often been underestimated. Given what has been said in section 2.1.5 on stereotype threats, it would not be very bold to say that caste limits functionings through a diminished self-image. This is the point made in Chapter 2.

2.3 Castes Distort Resources Allocation

Finally, there is a more conventional reason to be concerned with social institution in general and caste in particular : they may interfere with the efficient allocation of resources. For instance, discrimination may impede an efficient allocation of labor. This point is addressed by Akerlof (1976). Akerlof challenges the Arrow-Debreu general equilibrium model of perfect competition by refuting the assumption of complete and costless information. Rather, in the absence of complete information, agents resort to indicators, from which they infer the missing information. This is close to Arrow's statistical discrimination whereby potential employees abilities, that are unobservable, are inferred from stereotypes. The use of such indicators leads to equilibria that are not Pareto optimal. Akerlof concludes that "the use of *indicators* makes equilibrium income distribution and resources allocation dependent on these [social] divisions". Another example of how social institutions may distort resource allocation can be found in the literature on social fractionalization and the provision of public goods. As far as castes are concerned, Banerjee and Somanathan (2001); Banerjee et al. (2005); Banerjee and Somanathan (2007); Banerjee et al. (2008) and Bardhan (2000) showed that caste fragmented areas exhibit a lower level of public goods[40]. Accounting for social institution, does not only have a theoretical relevance as explained in the above sections, but also has consequences on policy designs and implementations. For instance, if the provision or use of public goods, which is core to many development policies, is hobbled by social fragmentation, the programs may not reach their targets unless they take social divisions into consideration. Similarly, if social customs command that some population categories do not need education, how will a nation build a human capital ? If high castes own water irrigation systems and are unwilling to sell them to lower castes, thereby reducing the yield of their land[41], how can agricultural production be maximized ? Thus social institutions ought to be taken into consideration if development policies are to be well targeted and designed.

[39] On caste atrocities, please refer to the account given by Cabalion (2010), for instance. See also stories about the Ranvir Sena private militia in Bihar known for its exactions against untouchables.

[40] This literature is challenged in more details in Chapter 4

[41] Such a situation is described in Anderson (2007)

3 Outline of The Dissertation

The four Chapters contained in this dissertation borrow from the three approaches presented so far. Chapter 1 raises the question of the emergence of a segregation norm even in the absence of prejudice against a particular group. It is striking to see that a large part of the literature on discrimination and segregation cannot depart from positing that agents do have exogenous preferences about who they interact with. I try to build a model where preferences do not have to be specified. Building on arguments developed by Weber (1978) and on historical facts, I envisage ideology as an *a posteriori* justification of an already existing situation. If this is true, then segregation can appear without the help of predefined preferences. Its origin seen in an unequal power distribution. As mentioned in section 2.1.6 the egression of social norms is still to be inquired and there is a debate about whether they originate from. Some of the features and conclusions drawn from the model are compelling such as the account for power, and the fact that it is a strive for association with the mighty that results in being rejected. Various examples are provided that support the conclusions. Yet, ways for improvements are provided at the end of the Chapter and the most promising is probably to adopt an evolutionary version of the model.

In Chapter 2, I investigate how binding being from a Scheduled Caste or Tribe is on perceived social status and question whether other characteristics such as education, occupation or income could partly or entirely counterbalance the caste effect. Results show that the group's effect is quite large and may differ between Scheduled Castes and Scheduled Tribes. This analysis is motivated by the fact that, as mentioned in section 2.2 of this introduction, self perception plays an active role in the forming of expectations and ambitions.

Finally, Chapter 3 and 4 develop the relationship between caste based fragmentation and public goods provision and usage and are therefore more policy oriented. Chapter 3 shows that the number of acts of violence against outcasts is positively related to the way water is distributed. The more common and shared the water source, the higher the number of violent acts. Two consequences may be inferred from this result. First, untouchability practices are still vigorous 50 years after the Constitution provided for its demise and caste norms are violently enforced. Second, publicly provided goods are not that public and individuals may be prevented from using them on caste grounds. This is an illustration of fundamental rights and functionings being denied. Chapter 4 pushes the investigation a notch further by studying whether caste fractionalization or polarization has an effect on the local presence of six publicly provided goods. Results show that if it has an effect it is likely to be a positive one, which is at variance with theoretical conclusions and with some of the previous empirical works, that exhibited a negative impact. On the other hand, polarization is found irrelevant, which casts doubt on the assumption, implicit in the literature that social fractionalization results in groups antagonisms. The positive relationship between social fractionalization and public goods presence is envisaged as a sign of potential caste based patronage. This hypothesis is investigated and some evidence is found that belonging to the dominant caste raises the likelihood for a household to access some of the goods. This tends to confirm that

caste appropriate publicly provided goods and may turn them into club goods. The last Chapter concludes the dissertation and puts forth an agenda for future research.

Chapter 1

Power and Endogenous Segregation

Every genuine form of domination implies a minimum
of voluntary compliance, that is, an interest
(based on ulterior motives or genuine acceptance)
in obedience.

Max Weber in *Economy and Society* (1909)

1 Introduction

The aim of this chapter is to model the emergence of a segregation norm without the interference of a priori prejudice but based solely on the power seize by one group. The idea stems from two sources : first segregated societies are often ones in which power is unequally distributed and second, prejudice and discriminatory norms may be thought of as a justification for an already existing social cleavages, in the spirit of the theory developed by Weber about the sources of political legitimacy[1]. This is also what Doniger and Smith (1991) strongly suggest in their introduction to the Laws of Manu, where caste's ideology happened to serve the already prominent priests either through a monopoly over sacrifice or the idea of ritual purity[2]. As far as castes are concerned, please remind that the religious text founding castes, Manu's code, mentioned in introduction to the dissertation, was probably written at a time where the Vedic society had already established segregation norms. Thus it may be an a posteriori justification of an already existing social organization. There is still a raging debate about whether social identity such as ethnicity is constructed as a response to institutional or economic incentives, or whether it is exogenous. By assuming and trying to show that social norms such as segregation may arise even in the absence of a priori preferences, makes way for the argument that such preferences are a posteriori construction to reinforce segregation or legitime this state.

This last point goes much further than what is modestly shown in this chapter and should be taken as a question raised by this piece of work. Yet, a quick review of the theories of discrimination show that it is difficult to address the issue of the very origin of discrimination. Although the work by Becker (1957) was seminal to structure and understand the process and consequences of discrimination, it unsatisfactorily address the origin of discrimination by referring to a vague "taste for discrimination". To his credit, finding the origin of discrimination was not his main concern. More informative is Arrow (1971) and the theory of statistical discrimination where prejudice makes up for a lack of information regarding individuals' capacities. Yet, one might wonder why certain criteria such as skin color are used rather than others ? Moreover, how come that such criteria are common knowledge ? Although these theories were very helpful at breaking down the discriminatory process, they probably provide too few elements about the root of prejudice, to whom discrimination is probably only the right-hand man.

Where do prejudice originate from is a question that has rarely been delved into by economists, who have given it up to other social scientists such as anthropolo-

[1]Please refer to section 2.1.6 of the introduction
[2]Please refer to section 1.1.2 of the introduction

gists and sociologists. Prejudice is taken here in its sociological acceptance that is the fact of inferring an individual's subjective characteristics, especially moral ones, from observable attributes such as sex or ethnic groups, etc. Intuition tells us that prejudice is indivisible from inequalities. Therefore it may be hypothesized that inequalities generate such a cleavage within a society that antagonism and rejection among groups and as a result prejudice appears, discrimination being a corollary. I wish to show in this article how one group's power of influence gives rise to segregation. My assumption is that prejudice and discrimination are the logic outcome of identity phenomena, that stems from a deep cleavage in society whose utmost form is segregation. Therefore, through the study of the creation of segregation, we may be able to understand the source of prejudice and push the discrimination analysis a notch further.

My work aims at showing that segregation may pre-exist prejudice. Works in the wake of Schelling (1969, 1978) theory have shown that a segregationist equilibrium may appear even in the absence of discriminatory dispositions. Such an equilibrium is the product of individuals' strategic decisions, who do not perceive the general effect of the sum of their micro-decisions. This impact may often widely differ from their individual motives. Although I fully concur on Schelling's view that segregation is the product of individual rational decisions that have nothing to do with discrimination, my work differs from Schelling's in one important way. In Schelling's model, individuals do bother even a little about the ethnic composition of their close neighborhood. Although preferences are weak, they nevertheless have to be specified in the model. Saying that segregation arises because white do prefer to live next to at least y% of their likes, more or less amounts to saying that segregation is not independent from discrimination and prejudice. In the model developed in this paper, preferences are endogenized. Therefore, I may be able to show that segregation may appear even in the total absence of prejudice.

I need to make clear what is understood here by segregation. This term has often been reduced to its spatial definition in economic works. Authors have mainly focussed on the fact for example that blacks and whites do not live in the same neighborhood, do not attend the same schools, etc. However, it can be argued that this term should be taken here in a broader sense. I define segregation as a refusal by members of different groups or communities to interact. Such a refusal may manifest itself through marriage decisions or by choosing a neighborhood or friends' company. Spatial segregation is only a specific case of this refusal to interact with members of another social or ethnic group.

Given my stand that (a) segregation is a systematic refusal to cooperate and (b) it is an equilibrium that stems from individual strategic decisions, game theory models seem appropriate tools to analyze the conditions under which this equilibrium appears. The model used in this paper is based on repeated prisoner's dilemma with random matching models that are common in the cooperation literature. Although, the model presented here is technically close to the one used in Eeckhout (2006) it differs in two major ways. First, Eeckhout (2006) main objective was not to study the emergence of a segregation equilibrium but to assess its efficiency. Second, this

author gave agents' segregationist strategies choices as exogenous. My objective is totally different given that I want to explain the emergence of a segregation equilibrium. Consequently agents strategies choices are entirely endogenous in my model. Indeed, segregation may not be explained if agents segregationist strategies are given as exogenous.

One of the main intuitions is that segregation can be explained by one group's power of influence on another. Power here is understood as the ability to give someone else opportunities that are otherwise unreachable, be these opportunities economic, social, spiritual, etc[3]. The basic mechanism is as follow. Considering a society with two costlessly identifiable groups, whenever one group has a power of influence on another, members of the second group will perceive additional benefits in building long-term relationships with the mighty. Their propensity to cooperate when matched with powerful individuals will increase until it reaches one. At this point, the powerless will surely cooperate when matched to powerful individuals. The mighty best response to this situation will be to systematically reject the relationship. The powerless will in turn refuse to cooperate. One of the final equilibria will be segregation. Therefore segregation's origin may be found in power capture by one group. One caveat is necessary. Although I fail to show that the segregation equilibrium is unique, the model highlights the process that may lead to segregation. Such a process may have an interest of its own.

The originality of this paper lies in (a) the broad definition given to segregation that allows various forms of segregation, even immaterial ones, to be encompassed in the analysis (b) evidencing that segregation does not come from the mighty's will to put the deprived group at its mercy but rather is inherent to specific economic or social conditions (c) showing that segregation may be totally independent from preconceptions (d) breaking down the process through which segregation equilibrium is put in place and analyzing its stability (e) accounting for selected historical examples.

This work is related to the literature on cooperation in game theory and to works on segregation. Section 2 provides a short review of these two literature trends. Section 3 gives an account of the model's main features and depicts equilibrium conditions assuming that social group membership has influence neither on strategies nor on pay-offs. Section 4 describes the mechanism through which segregation may germinate from power capture by one group. It also looks into the stability of the segregation equilibrium obtained. Section 5 discusses the findings and provides selected historical examples while section 6 deals with the limitations of the model and lay out potential ways for improvement whose investigation are left for future research. Section 7 concludes.

[3]For a discussion about the many facets of the term power and how I use it here, please refer to section 1.2.4 of the Introduction

2 Related Literature

It is striking that authors who investigated segregation phenomena mainly addressed three kinds of issues : (i) how is segregation perpetuated and why doesn't it collapse ? (ii) How could segregation be measured, and what point has it reached ? How has it evolved over time especially in the United States ? (iii) What are the properties of segregation equilibria ? Works on segregation may be grouped in three kinds along these three types of questions. Studies that intend to explain why do agents choose strategies that allow them to avoid contacts with members of another communities are few.

As far as the first issue is concerned, a couple of economists have tried to show how a society could move from a segregation equilibria to a more mixed one and vice versa. Akerlof (1976, 1980) identified some of the factors that prevent the caste system from collapsing but did not look into the forming of the caste institution. Scoville (1996, 2003) followed the same path. Lundberg and Startz (2007) presented a model that aim at explaining how segregation reinforces itself through prejudice. Chaudhuri and Sethi (2008) showed how neighborhood effects perpetuate segregation, while Loury (2000) emphasized the concept of social capital. Most of these works do raise the question of the persistence of segregation but not of its origin. Sethi and Somanathan (2004) did approach this issue. They found that segregation "can be stable when racial income disparities are either very great or very small, but instable in some intermediate range. And small income disparities can give rise to multiple equilibria, with segregation and integration both being stable". Even though these authors pointed out factors that make a society move from a segregation equilibrium to integration, their works exhibit one major drawback : they only depict movements of an already segregated society. The model fails to explain how segregation is produced *ex nihilo*, but shows how a society may return to its original situation. These types of analysis focus on societies that have segregation conditions already embedded in them and provide little help in explaining the occurrence of these conditions. However, these studies are helpful at establishing relationships between levels of segregation and other variables such as income distribution within and across groups.

The second kind of issue regards segregation measurement and calls for empirical studies. These works have mainly focused on either spatial segregation or labor market discriminations since these are the most tangible forms of segregation and almost the only viable source of data. Such pieces of work are legion. They provide interesting case studies but fall short of segregation emergence explanations.

The third group of studies does not address in my view the issue of the segregation origin but rather look into the efficiency of segregation equilibria. The study undertook by Cutler et al. (1999, 2008) is a good example. The work undertook by Eeckhout (2006) on which my model is based, does push the analysis quite far but finally fails to explain why do agents adopt segregationist strategies. In his article segregationist strategies are exogenous. The author is most concerned with the stability and Pareto efficiency features of a segregation equilibrium. The model constructed by Darity et al. (2006) is actually quite close to achieving my purpose as it investigates the formation of racial identity as a result of both intra and inter-group interactions. Yet, given that the authors postulate in their model

that agents can follow racialist strategies, which amounts to saying that they already have preferences, it is not entirely satisfactory.

Schelling (1978) works are an interesting exception to the three groups mentioned above. Schelling brilliantly managed to show how a segregation equilibrium may be produced by the junction of decisions made by individuals who do have only very mild preferences regarding whom they interact with. Nevertheless, such preferences need to be specified in his model. The question as to why do individuals prefer a certain proportion of their likes in their neighborhood is left open. So is also the question of the selection of a criteria that will define "them" as opposed to "we". Again there seems to be a missing link in the search for the very origin of segregation. I firmly share Schelling's view that segregation is generated by individual strategic decisions that did not intend to be discriminatory. Nevertheless, since agents do have preferences about whom they interact with in Schelling's model, it is not possible to conclude that segregation is entirely independent from prejudice.

The model used in this paper relates to the literature on random matching and repeated games. In this research field, the main question is how do individuals create and maintain long term relationships that are at odds with selfish individual motives. This problem is center to the study of segregation, as the latter may be viewed as a systematic rejection of any form of cooperation among two social groups. One solution to this problem provided by repeated game theory is that cooperation arises from a punishment threat such as reputation loss or social norms (see Rosenthal and Landau (1979)). Yet, how these norms appear and along which line is still not very clear. Answering this last question probably is what needs to be done if one is to explain the emerging of segregation. The present paper aims at showing that norms such as ostracism are the consequences and not the origins of a particular equilibrium, contrary to Lundberg and Startz (2007) position. Ellison (1994), Kranton (1996), Ghosh and Ray (1996) provide solutions to the cooperation emergence puzzle. Their models show that cooperative equilibrium may arise despite the absence of information flows among individuals and provided that players are sufficiently uncertain about their partners' valuation of future transactions, and that cooperation pay-offs increase over time. As already mentioned, the model presented here is technically close to Eeckhout (2006). Indeed Eeckhout (2006) resorted to repeated prisoner's dilemma with random matching as I do to analyze segregation equilibrium. However the objective of this article is totally different as my point is to evidence the process of segregation formation and his is to value the efficiency of a segregation equilibrium. Secondly, although the base model is identical to Eeckhout's it is then significantly altered in section (4) by the introduction of asymmetric pay-offs due to power capture by one group.

3 The Model

3.1 Basic Assumptions

Consider a society with a continuum of infinitely lived agents. In each period a mass one of the agents is born. Time is discrete. At the beginning of each t period, agents are either single or matched in pairs. Two social groups are present in society : Ls and Hs and no individual can possibly hide his membership to one group that is costlessly observable. The proportion of Hs in the society is denoted π. The model is symmetric prisoner's dilemma. In this section I suppose that social group membership has no impact on the game pay-offs. Individuals are randomly matched in pairs. Each individual while being in a relationship with another can choose between the action C which implies cooperation, or D, non-cooperation. When making the decision of action, each individual is unaware of his partner's simultaneous action decision. The action couple $\{C; C\}$ means that both partners cooperate, while $\{C; D\}$, means that the non cooperative individual who played D free rides his cooperative partner. The $\{D; D\}$ action couple means that both partners refuse to cooperate.
Hence the prisoner's dilemma action space is $A = \{C; D\} \times \{C; D\}$. The stage game pay-off function $\gamma \rightarrow \Re$ is as follows :

	C	D
C	$1; 1$	$-l; (1+g)$
D	$(1+g)\,; -l$	$0\,; 0$

where $g > 0$, $l > 0$. It is assumed that $g - l \leq 1$.

The action couple $\{D; D\}$ with pay-offs $(0, 0)$ is the only Nash and dominant strategy equilibrium. In this section, given that social group membership does not have any impact on pay-offs, it will be assumed that individuals will not condition their action decisions on their partners' social group, name or type. This situation will be investigated in section (4).

3.2 Game Lay-out

The game has numerous stages. The first phase could be identified as the "meeting period" where both individuals make their action decision without knowing the partner's decision. The outcome is observed by both individuals at the end of each stage of the game. Depending on the outcome, they individually decide whether they terminate the relationship. If at least one partner decides to terminate the match, the partnership is dissolved and a new match is formed in the second period. It is assumed that if one partner has played D, the match is terminated by the other partner. Hence a match could only go on if both partners have played C at each stage of the game. A player's strategy is defined as the rule that tells him which action to choose at each stage of the game, given his information set. In my model, a strategy would be to chose between cooperation and non cooperation at each stage of the game, given the information a player has, i.e. the past actions in the current match. Any strategy s over the repeated game has a pay-off that is the expected utility a player receives as the function of the strategies chosen by himself and the other players. Such a pay-off is denoted by $v(s)$ and players discount the future at

a common factor $\delta < 1$. The objective of the player is to maximize the normalized sum

$$\upsilon(s) = E(1-\delta)\sum \delta^t \gamma(s)$$

The normalization allows us to compare the repeated game pay-off directly with the stage game pay-off.

3.3 Equilibrium Conditions

I assume that individuals are not allowed to condition their actions on their historical actions in past partnerships and have no information about their partners actions in previous matches. Therefore, should a partner deviate and play D, the match is dissolved and the deviator can not be punished for its deviation beyond the termination of the match. Individuals will therefore be tempted to adopt a systematically non-cooperative strategy (systematically play D) and no cooperation can occur. In order to reach a certain level of cooperation a no-deviation constraint must be placed on strategies that is to say, the pay-off from deviating should be inferior to the cooperation pay-off.

3.4 No Deviation Constraint Definition

Given an infinite horizon, pay-off from cooperation is 1. pay-off from deviation (υ^D) can be written as :

$$\upsilon^D = (1+g)(1-\delta) + \delta\upsilon(s),$$

In a first period the deviator free rides his partner and receives $(1+g)$ discounted by the factor $(1-\delta)$ and has to start a partnership anew whose pay-off will be $\upsilon(s)$ discounted back by the factor δ. The no deviation constraint requires the pay-off from deviation (υ^D) to be lower than the pay-off from eternal cooperation that is to say 1. The non deviation constraint can be written thus :

$$\upsilon^D \leq 1 \text{ ,or } \upsilon(s) \leq 1 - g\frac{1-\delta}{\delta} \tag{1.1}$$

In other words, a s strategy may be considered as an equilibrium strategy provided its pay-off $\upsilon(s)$ is lower than $1 - g\frac{1-\delta}{\delta} = V$ i.e. provided that the no-deviation constraint is respected. Should a strategy pay-off be greater than V, then any player would systematically deviate from the equilibrium strategy that is play C until a deviation occurs. A player who adopts a strategy s such as $\upsilon(s) > V$ will systematically play D and no equilibrium can occur.

3.5 Equilibrium Strategies Definitions

Suppose players i and j enter into a relationship. Let's note for player i the pay-off from playing C by $F_i(s)$ at one stage of the game and the the pay-off from playing D by $G_i(s)$, where :

$$F_i(s) = \sigma_j + (1-\sigma_j)[(1-\delta)(-l) + \delta\upsilon_i(s)] \tag{1.2}$$

As $F_i(s)$ is considered, player i plays C with certainty. His partner j plays C with a probability σ_j. In this case, the outcome of the stage game would be $\{C, C\}$ and player i will receive a pay-off of 1. Hence the first term on the right side of the equation (σ_j). Should partner j choose to play D with a probability $(1 - \sigma_j)$, the outcome of the stage game would be $\{C, D\}$ and player i would be free ridden by his partner j (j is not cooperative while i is). Player i would receive in a first stage $-l$ discounted at a factor $(1 - \delta)$. Given that D had been played, a new match would be formed in the future whose pay-off will be $\upsilon(s)$ discounted at the rate δ.

$$G_i(s) = \sigma_j[(1 - \delta)(1 + g) + \delta\upsilon_i(s)] + (1 - \sigma_j)\delta\upsilon_i(s) \tag{1.3}$$

Similarly, player i is now assumed to play D. His partner j plays C with a probability σ_j, in which case, i would free ride j and receive $(1 + g)$ in a first stage discounted at a factor $(1 - \delta)$ and a new partnership would have to be formed given that the outcome is $\{C, D\}$. If partner j decides on playing D (probability $1 - \sigma_j$), then the outcome would be $\{D, D\}$, and player i would receive 0 in a first stage and a new partnership would have to be formed in the future which pay-off will be $\upsilon(s)$ discounted at the δ rate.

Then the expected pay-off for a newly matched individual i at the beginning of the game is

$$\upsilon(s) = \sigma_i F(s) + (1 - \sigma_i)G(s) \tag{1.4}$$

where σ_i is the probability that individual i will choose to play C. Equilibrium is defined as a strategy combination that consist of a best strategy for each of the n players in the game. Best equilibrium strategies s^* are the strategies players pick in trying to maximize their individual pay-offs. They are found by solving the following problem

$$\begin{aligned} s* \in \arg \quad & \max \upsilon(s), \\ \text{s.t. } & \upsilon(s) \leq V \end{aligned}$$

and in addition, supposing indifference between the pay-off of playing C and D if $\sigma_j \in (0, 1)$. Note that if the partner j plays C with certainty, i would no longer be indifferent between playing C and D and will choose D with certainty.

I suppose that when at equilibrium, social group membership does not make a difference in the choice of strategies. This equilibrium will be named a "mixed equilibrium". Specifically, the probability for a player to play C or D does not depend on the social origin of the partner.

4 Formation of a Segregation Equilibrium

4.1 Introduction of an Attractive Feature of Group H

So far, social group has had no incidence on partnership formation. Let's assume from now on that one group, the Hs, monopolizes all the economic resources. For example, the Hs may invade the Ls' country and seize most of the land or political power. Entering into a relationship such as marriage with an H may bring additional opportunities to an L. Ls will perceive additional value in a long-term relationship with Hs. In the context of India for example, a low caste father may be eager to have his daughter married to a higher caste man as such an alliance may give his own family, or if not his direct family his lineage, access to better opportunities. This may be true beyond the context of marriage. International trade literature has shown that less developed countries are more eager to trade with developed countries as these relationships give them access to products of different quality. This additional value perceived is symbolized by parameter z in the pay-off matrix. It is worth noticing that this additional parameter only appears on the L side in a H-L relationship. Intragroup pay-offs and Hs pay-offs are unchanged. Pay-offs for a H-L match are represented in the matrix below :

	C	D
C	$1;1+z$	$-l;(1+g)$
D	$(1+g)\,;-l$	$0\,;0$

4.2 Impact of The Parameter z on Relationships Pay-offs

Let's note $F_{H/L}$ the pay-off from playing C to a member of the H group when matched to a partner drawn from the L group. Similarly $G_{L/H}$ is the pay-off from playing D to a member of the L group when matched to a partner from the H group. Please note that the introduction of the parameter z only modifies the pay-off from playing C to an L who meets an H i.e. $F_{L/H}$. All other pay-offs remain identical as in section 3.5. For the sake of clarity the four possible cases are laid out below.

4.2.1 Pay-off to an H Individual in a H-L Relationship

$$F_{H/L} = \sigma_{L/H} + (1-\sigma_{L/H})[(1-\delta)(-l) + \delta \upsilon_H(s)] \tag{1.5}$$

Where $F_{H/L}$ is the pay-off from playing C to an H who meets an L. $\sigma_{L/H}$ is the probability that the L partner plays C given the fact that he is matched to an H. Should this case occur it means that both partners would have played C, pay-off to the H would be 1 and the partnership is never dissolved. Should the L partner choose to play D (probability $1-\sigma_{L/H}$), the H would be free ridden by the L, earn $-l$ in the first period (hence the $(1-\delta)$ discount factor), the relationship would be terminated and a new match formed whose pay-off to the H would be $\upsilon_H(s)$ discounted at a factor δ.

Symmetrically, pay-off from playing D to an H who meets an L is

$$G_{H/L}(s) = \sigma_{L/H}[(1-\delta)(1+g) + \delta \upsilon_H(s)] + (1-\sigma_{L/H})\delta \upsilon_H(s) \tag{1.6}$$

$\sigma_{L/H}$ the probability that the L plays C when matched to an H. In this event, H would have played D and L, C. H would earn $(1+g)$ in the first period and the match would break up. If the L individual chooses to play D (probability $(1-\sigma_{L/H})$), the action couple $\{D, D\}$ would appear. In this case no one would receive any payment in the first period, the relationship would be terminated and the H would start a new match whose discounted pay-off is $\delta v_H(s)$.

The expected pay-off for an H that is newly matched to an L is therefore

$$v_{H/L}(s) = \sigma_{H/L} F_{H/L}(s) + (1-\sigma_{H/L}) G_{H/L}(s) \tag{1.7}$$

where $\sigma_{H/L}$ is the probability that the H chooses to play C given the fact that the other player is drawn from the L group.

4.2.2 Pay-off from Intragroup Relationships

Intragroup relationship pay-offs are derived in the same way as above. For an H meeting an H

$$\begin{aligned} F_{H/H}(s) &= \sigma_{H/H} + (1-\sigma_{H/H})[(1-\delta)(-l) + \delta v_H(s)] \\ G_{H/H}(s) &= \sigma_{H/H}[(1-\delta)(1+g) + \delta v_H(s)] + (1-\sigma_{H/H})\delta v_H(s) \\ v_{H/H}(s) &= \sigma_{H/H} F_{H/H}(s) + (1-\sigma_{H/H}) G_{H/H}(s) \end{aligned}$$

For an L meeting an L

$$\begin{aligned} F_{L/L}(s) &= \sigma_{L/L} + (1-\sigma_{L/L})[(1-\delta)(-l) + \delta v_L(s)] \\ G_{L/L}(s) &= \sigma_{L/L}[(1-\delta)(1+g) + \delta v_L(s)] + (1-\sigma_{L/L})\delta v_L(s) \\ v_{L/L}(s) &= \sigma_{L/L} F_{L/L}(s) + (1-\sigma_{L/L}) G_{L/L}(s) \end{aligned}$$

4.2.3 Pay-off to L Individual in an H-L Relationship

Pay-off from playing C to an L member matched to an H is somewhat different due to the introduction of the parameter z.

$$F_{L/H} = \sigma_{H/L}(1+z) + (1-\sigma_{H/L})[(1-\delta)(-l) + \delta v_L(s)] \tag{1.8}$$

If the L partner chooses to play C and the H partner is also cooperative (probability $\sigma_{H/L}$) then a long-term relationship may be set up and the L individual will gain 1 from the partnership plus all the additional opportunities such a partnership may provide him with. The value of these additional opportunities is estimated by the parameter z. Note that this parameter plays a role only if the action couple $\{C; C\}$ is the outcome. Pay-off from playing D to an L matched to an H is similar to those occurring in intragroup matches.

$$G_{L/H}(s) = \sigma_{H/L}[(1-\delta)(1+g) + \delta v_L(s)] + (1-\sigma_{H/L})\delta v_L(s) \tag{1.9}$$

The expected pay-off for an L who is newly matched to an H is therefore

$$v_{L/H}(s) = \sigma_{L/H} F_{L/H}(s) + (1-\sigma_{L/H}) G_{L/H}(s) \tag{1.10}$$

I mentioned in section (3) that at the mixed equilibrium, i.e. prior to the introduction of the parameter z, players do not condition their strategies on the social origin of their partner. Therefore $\sigma_{L/H} = \sigma_{L/L}$. Now that z has been introduced in the pay-off matrix, it can be argued that L players will modify their probability to play C when matched to an H. It is in their interest to do so.

4.3 Systematic Cooperation from the Ls Leads to a Segregation Equilibrium

It is quite obvious that the introduction of the z parameter increases Ls' potential pay-offs. In the event of a match with an H they do not only benefit from the value of the match itself but also from additional social opportunities such a relationship may bring them. The intuition is as follows : Ls individuals have a strong interest in building long-term relationships with H members. They are enticed to cooperate when matched to an H in order to maximize the chance of having a long term relationship. The probability to play C for an L meeting an H increases up to 1 as a consequence of the introduction of the parameter z. Now that the H individual knows for certain that the L partner will cooperate, he has no incentive anymore to cooperate. He would be better off by systematically free riding his cooperative partner. In this case, an equilibrium strategy will be for the H to systematically reject any cooperation with an L. One of the final equilibria is a situation where a guaranteed cooperation from one group leads the other group to systematically reject any relationship with this group. Perfect segregation has emerged and in the aftermath prejudice that reinforces segregation. It is rather counter intuitive to think that segregation germinates from the yearning by one group to cooperate with another.

Proposition 4.1 *The introduction of the parameter z increases the probability for an L to play C when matched to an H up to 1 that is $\sigma_{L/H} = 1$*

Proof I mentioned that an equilibrium condition must be the indifference between the pay-off of playing C or D that is $F(s) = G(s)$. If this condition was not satisfied, a player would modify his probability to play C. For example, if the pay-off from playing C increases comparatively to the pay-off from playing D, $(F(s) > G(s))$ a player would adjust upward his propensity σ to play C, until the equality condition between $F(s)$ and $G(s)$ is restored. Let's note $\Phi = F(s) - G(s)$. I assume that $\frac{\partial \sigma}{\partial \Phi} > 0$. The introduction of the parameter z alters the pay-off from playing C for an L who is matched to an H. The L individual will therefore alter his probability to play C $(\sigma_{L/H})$ consequently. Let's note $\Phi_{L/H} = F_{L/H}(s) - G_{L/H}(s)$
then $\frac{\partial \sigma_{L/H}}{\partial \Phi_{L/H}} > 0$
The following equation can be written :

$$\frac{\partial \sigma_{L/H}}{\partial z} = \frac{\partial \sigma_{L/H}}{\partial \Phi_{L/H}} \frac{\partial \Phi_{L/H}}{\partial z}$$

where we know that the first term on the right hand side of the equation is positive. The second term of the equation is also positive since the inclusion of the parameter z has unilaterally increased $F_{L/H}(s)$ without altering $G_{L/H}(s)$. Introducing the parameter z increases $\sigma_{L/H}$ i.e. the probability for an L who meets an H to cooperate.

An increase in $\sigma_{L/H}$ will alter the pay-off for the H matched to an L to play C comparatively to playing D. Indeed, if the H individual learns that his L partner cooperates more frequently, playing C will be more valuable to him. $\Phi_{H/L}$ will be modified and $\sigma_{H/L}$ will therefore be adjusted. A movement in $\sigma_{H/L}$ will modify in turn $\sigma_{L/H}$, and so on. So the total effect on $\sigma_{L/H}$ due to the introduction of the parameter z can be written :

$$\frac{\partial \sigma^t_{L/H}}{\partial z} = \frac{\partial \sigma^i_{L/H}}{\partial z} + \frac{\partial \sigma^i_{L/H}}{\partial z} \sum_{j=1}^{n} (\frac{\partial \sigma_{H/L}}{\partial \sigma_{L/H}} \frac{\partial \sigma_{L/H}}{\partial \sigma_{H/L}})^j = \frac{\partial \sigma^i_{L/H}}{\partial z}(1+n)$$

Where $\frac{\partial \sigma^i_{L/H}}{\partial z}$ is the initial impact of z on $\sigma_{L/H}$ and $\frac{\partial \sigma^t_{L/H}}{\partial z}$ is the total effect of the introduction of z. The introduction of z has two impacts :

- one with the direct increase of $\sigma_{L/H}$ via the increase of $\Phi_{L/H}$

- one with the cumulative effect of a positive shock on $\sigma_{L/H}$. n is the number of periods in the game needed for players to adapt their action strategies. It is argued that there exists n^*, so that $\sigma_{L/H}$ will move from its mixed equilibrium level ($\sigma_{L/H} = \sigma_{L/L}$) to a new equilibrium level $\sigma_{L/H} = 1$. n^* is defined by the following equation :

$$\frac{\partial \sigma^i_{L/H}}{\partial z}(1+n^*)dz = 1 - \sigma_{L/L}$$

Proposition 4.2 *Whenever $\sigma_{L/H} = 1$ the only possible equilibrium for an H-L partnership is given by $\sigma_{H/L} = 0$*

Proof Recall that in order for a strategy s to be an equilibrium strategy, the no deviation constraint must be respected that is to say
$\upsilon(s) \leq 1 - g\frac{(1-\delta)}{\delta}$.
If $\sigma_{L/H} = 1$,
$F_{H/L} = \sigma_{L/H} + (1 - \sigma_{L/H})[(1-\delta)(-l) + \delta\upsilon_H(s)] = 1$
$G_{H/L}(s) = \sigma_{L/H}[(1-\delta)(1+g) + \delta\upsilon_H(s)] + (1-\sigma_{L/H})\delta\upsilon_H(s)$
$G_{H/L}(s) = (1-\delta)(1+g) + \delta\upsilon_H(s)$
$\upsilon_{H/L}(s) = \sigma_{H/L}F_{H/L}(s) + (1-\sigma_{H/L})G_{H/L}(s) \leq 1 - g\frac{(1-\delta)}{\delta}$
$\upsilon_{H/L}(s) = \sigma_{H/L} + (1-\sigma_{H/L})[(1-\delta)(1+g) + \delta\upsilon_H(s)] \leq 1 - g\frac{(1-\delta)}{\delta}$
After re-arranging,
$\sigma_{H/L}[\delta - g(1-\delta) - \delta\upsilon_H(s)] \leq \delta - g(1-\delta) - \delta\upsilon_H(s) - g\frac{(1-\delta)}{\delta}$
Recall that $V = 1 - g\frac{(1-\delta)}{\delta}$,
then $\delta V = \delta - g(1-\delta)$
Thus,

$$\sigma_{H/L}[\delta][V - \upsilon_H(s)] \leq [\delta][V - \upsilon_H(s)] - g\frac{(1-\delta)}{\delta} \tag{1.11}$$

A strategy s is an equilibrium strategy provided that the above equation holds.

Recall that V is the non deviation constraint i.e. the highest attainable pay-off for any equilibrium strategy. Therefore any player tries to minimize the difference $V - \upsilon_H(s)$. However, we know that $0 \leq \sigma_{H/L}[\delta][V - \upsilon_H(s)] \leq [\delta][V - \upsilon_H(s)] - g\frac{(1-\delta)}{\delta}$
Therefore, $[\delta][V - \upsilon_H(s)]$ lowest level is $g\frac{(1-\delta)}{\delta}$.
Minimizing $[\delta][V - \upsilon_H(s)]$ is equivalent to replacing the expression by its minimum $g\frac{(1-\delta)}{\delta}$ in the equation (11) :
$\sigma_{H/L}[g\frac{(1-\delta)}{\delta}] \leq 0$
Since, by definition, $[g\frac{(1-\delta)}{\delta}] > 0$ and $\sigma_{H/L} \geq 0$, the only way for the above equation to hold is $\sigma_{H/L} = 0$

The only strategy that maximizes the pay-off while respecting the no deviation constraint is $\sigma_{H/L} = 0$ when $\sigma_{L/H} = 1$. In other words, if a partner cooperates for

sure, the only strategy that guarantees both an equilibrium and the other partner's pay-off maximization is a systematic non-cooperative behavior.

Once $\sigma_{H/L} = 0$, i.e. the Hs play with certainty D when matched to an L, Ls maximize their pay-off in such a match by setting their probability to play C to 0 i.e. $\sigma_{L/H} = 0$.
Indeed, if $\sigma_{H/L} = 0$
$F_{L/H} = (1-\delta)(-l) + \delta v_L(s)$
$G_{L/H}(s) = \delta v_L(s)$
$v_{L/H}(s) = \sigma_{L/H} F_{L/H}(s) + (1-\sigma_{L/H}) G_{L/H}(s)$
$v_{L/H}(s) = \sigma_{L/H}(1-\delta)(-l) + \delta v_L(s)$
Given that $\sigma_{L/H}(1-\delta)(-l) \leq 0$, $v_{L/H}(s)$ is maximized by setting $\sigma_{L/H} = 0$.
It is worth noticing that whenever one of the partner plays D with certainty, the other partner maximizes his pay-off while respecting the no-deviation constraint by setting his probability to play C at 0.

4.3.1 Equilibrium Stability

The equilibrium obtained here is a segregation equilibrium where members from two groups systematically refuse to cooperate when matched to each other. The path to the segregation equilibrium is as follows :

- one social group captures more power or economic resources. The other group (the Ls) perceive additional benefits from entering into long-term relationships with the previous group (the Hs) through additional opportunities or may not have much choice but to cooperate to survive. The parameter z is introduced in the matrix.

- the introduction of the parameter z increases the propensity of L group members to cooperate with Hs, which increases the likelihood of a cooperation from the Hs, which in turn raises the probability for Ls to play C, and so on. At the end of n^* periods, Ls cooperate with certainty with Hs. At this time, although the probability for Hs to play C has reached quite high levels, as soon as $\sigma_{L/H} = 1$, Hs have no equilibrium strategy available but to be systematically non-cooperative with Ls, thus $\sigma_{H/L} = 0$.

- Whenever $\sigma_{H/L} = 0$, Ls maximize their pay-offs by choosing never to cooperate whenever matched to an H, thus $\sigma_{L/H} = 0$

At the end of the n^* periods a segregation equilibrium prevails : members of the two groups will systematically refuse to cooperate when matched to each other. As mentioned above, as soon as one partner sets his probability to play C to 0, the other partner will reciprocate by setting his probability to play C to 0 and cannot be better off. Therefore $\sigma_{L/H} = 0$, $\sigma_{H/L} = 0$ is a stable equilibrium on the L-H market.

The path that leads to a segregation equilibrium is rather interesting. Assuming that one group is deprived of power, it has not much choice but to cooperate with another. I may conclude that given this systematic cooperation, the latter will refuse any interaction with the first one. Finally the deprived group's best response will be to refuse any relationship too. This result is rather enlightening when thinking about the ambiguity one may find in the dominated groups attitudes towards dominant groups. Dominated often wishes to conform to the dominating (translating a will to cooperate) while depreciating them when they feel rejected by the mighty. As the

fox in Aesop fable who can not reach grapes hanging high up on a vine, that he eyed greedily retreats and says : "The grapes are sour anyway !".

5 Main Findings and Illustrative Examples

Two interesting points stand out from the demonstration above. Firstly, segregation is not reduced to psychological and exogenous factors such as prejudice or a taste for discrimination whose origins are unquestioned. Such a situation is seen as arising from a socioeconomic context in which one group has taken over much of the power, be this power economic, political or to some extent symbolic. I have tried to show that an unequal opportunities distribution triggers social strategies that generate a stable segregation equilibrium, independently from exogenous preferences.

Secondly, it has been shown that segregation may not originate from a favored group's intention to put a deprived group at its mercy, contrary to Roemer (1979). On the contrary, it is the systematic yearning or necessity by the latter to build long-term relationship with the mighty that leads to a rejection by the favored group of any relationship with the powerless. This last point is particularly important as it is at odds over generally accepted ideas about segregation and discrimination. Indeed it is striking to see that segregation has always been dressed up with ideologies that suggest that higher-ups do rightfully despise their subordinates, thereby spreading the idea that segregation comes from the dominating group. However, I believe that such an ideology could only entrench where effective segregation is already in place. In my view, segregation may not be the fact of the mighty, but the product of a specific situation. These results could be compared to La Boetie's conclusions in his *Discourse on Voluntary Servitude* (de La Boetie (1576)). For La Boetie, tyrants' power comes from an historical shock that made people surrender their freedom. This domination is perpetuated by the ideology. In the same spirit, Weber's account of the origins of the authority legitimacy suggests that ideology is a way to legitimate an existing authority.

Power capture is seen as the segregation root. The term power should be taken in a broad acceptance, that is the ability to give someone opportunities that are otherwise unreachable. Note that this definition of power enables to account for various forms of segregation. Indeed, priests may be poor, but as they hold the key to the gods favors, they do have a spiritual power and therefore may be placed above the crowd. I have suggested that the process through which segregation occurs starts with a dependence of one group on another to gain access to additional opportunities. The deprived group will start looking for long-term relationships with the more powerful group who in turn will start setting up barriers. The caste system in India is an enlightening example of the segregation emergence.

As discussed in section 1.2.1 of the Introduction, the "purity of descent" theory places the origins of caste, or at least endogamy, in the Aryan domination. As they gained power, either military or culturally or economically, authors argue that they started establishing separation rules between the conquerors and the conquered. Even if one des not agree with this theory, whether because of the inconsistencies pointed out by Klass (2004) or because of the lack of historical records, the fact that it is the most influential of all and widely accepted still tells that scientists find

it very tempting to see the origins of a segregationist system such as caste in the power exerted by one group.

The presentation in section 1.1.2of the textual sources of caste, showed that the supremacy of the priests in Vedic times was coming from their monopoly over sacrifices, which was the only way for others to obtain the benevolence of the deities. The priests had a spiritual power of influence. Doniger and Smith (1991) argue that when the Vedic values were reversed, the Laws of Manu was an attempt by the priests to more firmly establish their supremacy by extolling the virtues of their group.

Moreover, the correlation often observed between caste status, power and wealth as well as the fission and *Sanskritization* processes described in section 1.1.4 also clearly stress that as a group gains influence, it endeavors to restrict relationships with those they want to depart from. All these examples clearly point in the direction given by the model. Power exerted by one group over another is tied to restricted interactions between the two groups.

Another interesting historical example is colonization. It is striking that Portuguese colonies contrary to the French and British ones, were not segregated. While the Portuguese mainly set up trading posts, the French and the British led an active power and wealth takeover policy. In the French and British empires, natives had to be cooperative with the new masters to secure social opportunities, while in Portuguese colonies trade enabled locals to make social progress on their own. In the first case, segregationist ideologies appeared while in the second a more integrated situation prevailed. Amartya Sen recounts in "The Argumentative Indian : Writings on Indian History, Culture and Identity" an interesting story. At the time when British trading posts were created in India in the XVIIth and early XVIIIth centuries, some British actually settled into the sub-continent, married Indian women and somewhat managed to mingle with the local society. Then came the time of the proper colonization process in the XIXth century, when the Honorable East India Company and later the British government took over power and wealth in the sub-continent. The locals had then to deal with the new masters to secure social opportunities. At that time, a new ideology started to appear in the *Raj* according to which India and its civilization were backward and needed to be patronized. Indian and British communities were set aside and any admitted relationship between the two was to be on a teaching mode. The power takeover by the British led to a segregation between Europeans and Indians that is well illustrated by novels from that time.

6 Limitations of The Model

This model brings some interesting points to light. First, segregation may arise even in the absence of prejudice from the decentralized interactions of many individuals. Power capture may be the origin of segregation by balancing the distribution of opportunities towards one group. Yet, the framework is unsuccessful at proving that the segregation equilibrium is one among a limited number. Besides, the inelegance of the equilibrium definition, comes from the fact that the path that leads from a neutral situation to a segregated one, probably has an interest of its own. This

is the reason why I tried to describe it. A potential way to fix these two problems would be to rewrite the model in an evolutionary framework. besides it is probably the most appropriate way to study the path that leads to segregation, that is, as said, of great interest. This task is left for future research.

The addition of two features would also give the model more depth and allow it to better catch reality. First, only two groups are modeled and little is said about what becomes of mixed couples. For instance, what happens to an H who meets an L ? Does he become an L by his marriage, or does the L becomes an H ? Most likely, we can think of the L as becoming an H, otherwise there would be little point for him to cooperate with Hs in the hope to grab the z. Yet, does he have access to power in the same was as an H ? Wouldn't the pair be considered as an in between category between the H and L ? Let's think about Ancient Regime European aristocrats and how the pedigree of their ancestors was put forward to assert their status. Marrying a bourgeoise was often done out of necessity and probably was considered as an exchange of status for wealth. Similarly, the South African Apartheid did distinguish between the whites, the blacks and the "colored" people. Therefore introducing a mixed category that benefit from a fraction of the power would add much to the model.

Moreover, the power parameter z is held constant throughout the process, while it is very likely that the value of power will depend on social composition. Assume that H that are matched for a long period of time with L, become either an L or a mixed category. During the phase where such matches are not only possible, but very likely due to the increase in the Hs and Ls propensity to cooperate, the power devoted to the H is going to be shared by a reduced number of "true" H and the worth of each share may increase. Thus, z would increase and each step of the game may shorten the convergence period to a segregation equilibrium.

Lastly, the main cooperation enforcement mechanism is the need for a defector to rematch anew. This probably isn't sufficient to account for some features of reality. For instance, social norms and obligations are often thought as signals of potential cooperation. For instance, higher castes were constrained in many ways in their behavior, such as diet restrictions, ritual education. The renowned sociologist Srinivas, noted that in order to rise in the caste hierarchy, castes members were going through a *Sanskritization* process that mainly consisted of altering their manners, diets and acquiring religious education. The role of these norms are absent from the framework, given the assumption that group membership is costlessly observable. Yet, the introduction of the norms and of a probability that such norms may be correctly interpreted would also be an interesting adjunction for the model.

All these adds on may largely improve the model and are promising approaches for future research. I would be particularly keen on translating the model in an evolutionary framework, since this probably is the most appropriate way to find the emergence of norms without specifying preferences as in Axtell et al. (2004). The model proposes an explanation of the emergence of social orders, such as segregation, as a result of accidents of history whereby a group of individuals receive a

distinguishing tags (in this model this would be power). As theses accidents become reinforced over time, "society may self-organize around distinctions that are quite arbitrary from an a priori standpoint [...] Initially meaningless tags can acquire socially organizing salience : tag-based classes emerge". The starting point of the work by Axtell et al. (2004) matches the requirements for an initial situation that very much reassembles to a blank page. However, I would depart from their results by saying that segregation is not, in my view an accident of history. Although it can be random, chances are that some initial conditions makes its emergence very likely.

7 Concluding Remarks

This paper provides an analytical framework of a phenomenon, namely segregation, that is often considered as exogenous and intricate. It aims at identifying segregation triggers and breaking up its formation process. In my analysis, segregation stems from specific circumstances in which one group seizes power. Dominated group members are given little choice but to systematically cooperate with the mighty. A natural response to a potential partner's ensured cooperation is to reject the relationship. This is what the powerful group will do. The dominated group will best reply to this situation by in turn rejecting cooperation. A stable segregation equilibrium is set.

Three interesting points may be drawn from this analysis. First, segregation is seen as entirely independent from psychological factors, prejudice or even exogenous preferences regarding whom to interact with. This supports the belief that discrimination arises from segregation and not the opposite. Second, the analysis shatters the generally accepted idea that segregation is deliberately introduced by the mighty to firm up their domination. Indeed, it is shown that specific circumstances create segregation through the dominated group's necessity to establish long term relationships with the powerful. Third, the analysis is detailed enough to account for various social situations such as the *jatis* fission process, for example.

Although this demonstration helps at understanding segregation and its consequences, it falls short of explaining why some societies exhibit high levels of segregation, as it is the case in India through the caste system, and other societies lower levels of segregation. How could a society move from a segregation equilibrium towards a mixed one is a question that is left for future research. My intuition is that power distribution within the groups is key. Should members of the deprived group become powerful, the mighty may find interesting to start collaborating again. The rise of the bourgeoisie in Western Europe during the XVIIIth century would be an interesting case study. Besides, the remarkable stability of the segregation equilibrium, mays suggest that segregation could not be uprooted without special external intervention. Another related issue that would be exciting looking at is the development of ideologies that aim at justifying already existing segregation and how they become accepted as a social norm.

Chapter 2

Social Identity in India : Caste and Beyond ?

1 Introduction

Social identity is becoming an increasingly popular concept among economists. How do individuals categorize themselves and what these groups identifications imply are central issues (Akerlof and Kranton (2010)). Although the concept has long been known to various disciplines such as psychology, history, political science and anthropology, it had remained for some time outside of the scope of economic analysis until Akerlof and Kranton (2000) plead for its integration in the economic corpus and showed how powerful it is to explain many puzzling economic issues. It was first introduced in social psychology by Tajfel et al. (1971) to explore discrimination and social conflict. Since then the notion has made its way into the economic literature. Akerlof and Kranton (2000, 2005) showed how internalizing norms lead individuals to act in conformity to the stereotype attached to their groups although such actions may be detrimental. This phenomenon has been the focus of a growing literature in social psychology and is often referred to as "stereotype threat". Experiments clearly evidenced that stressing social identity does modify preferences (Benjamin et al. (2007)), behaviors (Chen and Li (2009); Charness et al. (2007)) or even prices (Ball et al. (2001))[1]. An experiment that is of particular interest to my study is the one conducted by Hoff and Pandey (2006). Children from Northern India were asked to solve mazes. When caste identity was not revealed, performances across castes did not significantly differ. Yet, when caste was made salient, performance of the low caste significantly decreased. Such experiments clearly stress how internalized norms can lead to "self-discrimination" as individuals obey norms and prejudice to conform to social identity. This definitely is a breakthrough as discrimination theories, be they "taste based" or "statistical", tended to view discrimination as a one way act imposed on the victim. This view is now somewhat moderated by the concept of implicit discrimination developed by Bertrand et al. (2005)

Another more general justification for the study of social identity can be found in Sen (1973, 1992) or in Sen (1999c,b). Not only does social identity affects economic processes as mentioned, but it also alters inequality in income distribution as well as opportunities offered by such income. In Sen's words, social identity may undermine capabilities and therefore impact social welfare and although Sen particularly stressed gender bias in Sen (1992), not a great deal of imagination is needed to think about castes in the same terms. For instance, not only may a low caste individual be less well endowed with income for instance, but such an income may not bring the same opportunities in terms of functionings, because of caste membership. Besides, social identity in the context of secular deprivations and oppression, may engender "adaptative preferences", that are preferences formed in response to restricted options. Thus, the absence of dissatisfaction of these individuals with regard to their condition, that stems from a well anchored social identity, would not from a utilitarian perspective lead to account for these inequality, while they must not be ignored from a social welfare perspective.

Thus, because social identity is the key to solve many unexplained economic outcomes, such as self discrimination, or lower educational outcomes in certain com-

[1]For a more detailed review of these experiments please refer to Chen and Li (2009)

munities, its influence goes much deeper by altering preferences and limiting capabilities. For these reasons, social identity ought to be studied in economics.

Caste has molded Indian society in many respects. A couple of works such as Borooah (2005), Deshpande (2000b, 2001), Gang et al. (2008) have shown how important caste is in shaping discrimination, deprivation and inequality. Lawmakers made no mistake about it, when they outlawed caste-based discrimination in the 15th article of Fundamental Rights in the Constitution of India and provided for reservation policies in favor of low castes members in the same text. Laws have been passed for the last 50 years aiming at protecting what is discreetly referred as "weaker segments of society". Programs have been voted to alleviate the situations of the former untouchables, now administratively called the Schedules Castes ("SC") and that of the Scheduled Tribes ("ST"). Yet, caste remains an important ground for inequality, poverty and discrimination. Inequality comes both from differences in endowments across castes and differences in treatment linked to discrimination. However, as the experiment conducted by Hoff and Pandey (2006) showed, internalized norms and stereotype threat are also powerful factors of stark inequality and a limitation to capabilities.

In India, caste is probably a deep determinant of social identity as many anthropologists and sociologists have shown. Caste considerations may be quite pervasive as the caste code may govern many aspects of Indians' everyday life such as marriages, rituals, social interactions and even food diets. Despite the large heterogeneity in obedience to the code, caste probably remains a central issue in social identification. Yet, is caste the beginning and the end of social identity in India ? Are there other factors, besides castes that could significantly influence the sense of self with respect to others ? For instance, will a rich outcasts relate in the same way to his fellows and other castes as a poor one ? These are questions I wish to dispute and try to answer. I want to identify whether other aspects such as education, occupation or income do also shape the perceived social status along or instead of caste ? Another hypothesis I wish to test is whether caste also influence the effect of these endowments with regard to perceived social status. For instance, education may be efficient at improving social status, but so only among high castes. In such an event, caste would not only determine endowments but also the efficiency of such endowments with respect to social sense of self. To test all these hypothesis and try to provide some answers to these questions, the study will focus on a question asked in the World Values Survey : "to which of the following social class do you think you belong to ?".

Despite the heated debate taking place among sociologists and anthropologists about the origins and the nature of castes, most social scientists have placed caste at the center of social identification in India and have underlined, probably following Dumont (1970), caste cleavages and the fact that they are supported by a strong ideology that reinforces exclusion and inferiority norms. Yet, a pitfall lies in wait for anyone who addresses the issue of caste in India, that is to consider caste as the only determinant of social identity that no other factor, such as wealth, could mitigate. Such a fault has lead many social scientist to consider caste in a rather monolithic way, when caste is a rather fluid institution. Some sociologists have been aware of

this issue as some of them such as Beteille (1974), Srinivas (1962), or Bailey (1957) have tried to untangle the effect of power, wealth and caste in shaping social identity.

Sen (2004) stressed the plurality of identities and I propose to examine wether caste is the sole determinant of social identity in India. I will try to identify the relevant factors that influence perceived social status and compare the magnitude of their effects with that of caste. Results highlight three points : first caste has a stronger effect on social identity among Tribes than among Scheduled Castes. While some improvements in earnings or occupational status may be able to cancel the Scheduled Caste effect, no such variations may counterbalance the tribe effect. Besides, the caste effect manifests itself in both a direct and an indirect ways. Results show, that the effect of income for instance is diminished by low caste membership. It could be hypothesized, although this is beyond the scope of this chapter, that SCs social identity is less dependent upon caste than STs, because they successfully mobilized politically. Political studies by Jaffrelot (2002) go in that direction.

Before going further in the analysis, some terms need clarification. So far, I have questioned the relevance of caste in perceived social class. Yet, this study mainly focuses on three groups : the non scheduled ones, the Scheduled Castes and the Scheduled Tribes. Yet the identification of the latter as a caste is rather complex issue as mentioned in section 1.1.3 of the general Introduction to the dissertation. Given the tricky relationship between castes and tribes, and to be rigorous, what was earlier described as a caste effect will from now on be referred to as a "group effect".

The paper is organized as follows : section (2) presents the data as well as the model used. It provides some compelling summary statistics on the social classes distribution across castes. Section (3) presents a discriminant analysis of the determinants of social identity. Section (4) presents the empirical strategy, while section (5) discusses the results. Concluding remarks are found in section (6).

2 Data

2.1 Presentation of The Data

The data are extracted from the Indian section of the World Values Survey ("WVS") conducted in 1995 and 2001 [2]. Please note that the sampling was based on voting rolls and the method has consequences that will be discussed in section 2.2.

The survey covers 8,543 households, although caste is informed only for 3,403 of them. Unfortunately, caste is only informed for individuals of Hindu denomination. The analysis is therefore restricted to this group. I am particularly interested in one of the question asked during the face to face interviews : "to which of the five social classes do you think you belong ?"[3]. Please note that interviews were conducted in

[2]Other rounds of the survey are not workable since information about caste is unavailable.

[3]It is important to bear in mind that questions were translated and that the connotation of the classes' labels may be quite different from what is commonly understood in English. Very likely,

13 local languages and thus the question was translated. Households are grouped into 8 castes. In order to avoid ranking these groups, whose relative social status are far from obvious, and as such an attempt would leave room for subjectivity, I will focus on the lower end of the social scale : the SCs and the STs whose positions are clear-cut. These two groups will be compared to the rest of the population , the non-scheduled groups. Table 2.1 below present the contingency table for the distribution of castes across classes.

TAB. 2.1 – Contingency tables for castes and classes

	SC		ST		Non-Scheduled		Total
Lower class	146	12%	205	21%	151	12%	502
Working class	137	12%	309	32%	225	18%	671
Lower middle class	360	31%	316	33%	565	45%	1 241
Upper middle class	383	33%	132	14%	283	22%	798
Upper Class	143	12%	10	1%	38	3%	191
Total	1 169	100%	972	100%	1 262	100%	3 403

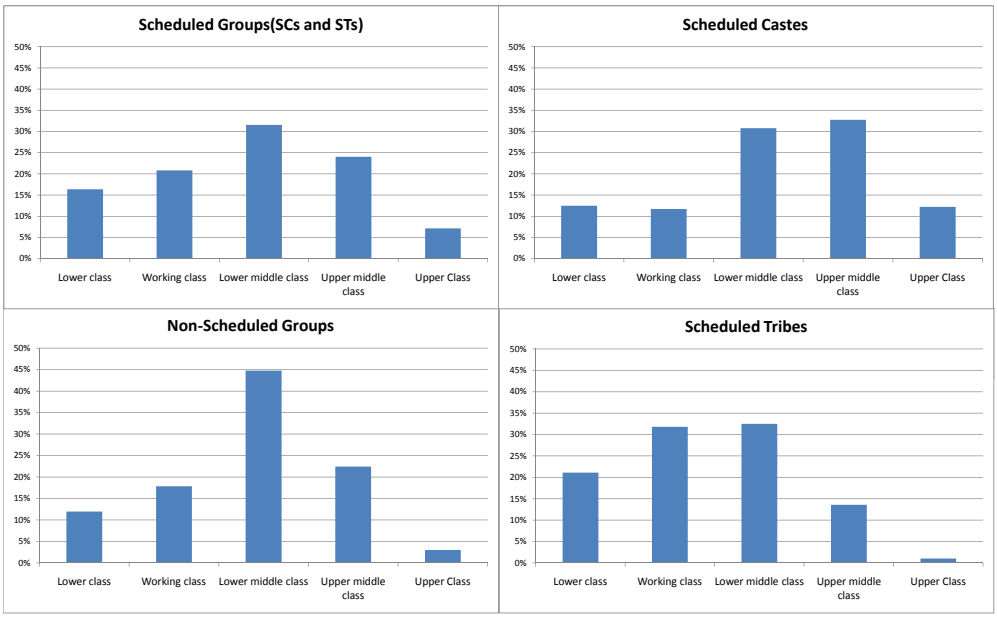
Nearly half of the SCs class themselves in either upper or upper middle classes, while only 25% of the non-scheduled groups do. This is rather unanticipated given that SCs are expected to be at the lower bound of society together with the STs. Yet, STs do perceive that they belong to the lower end of social classes, although both SCs and STs are, as argued in the introduction to the dissertation, more or less equally low positioned in the caste hierarchy. It seems that group stigma is not as strongly felt by SCs compared to STs. Whether this better position is due to higher income or better education is to be investigated later in the chapter. Pearson's χ^2 tests for the homogeneity of the distribution in classes across caste groups conclude that the distribution actually differ between SCs and STs, SCs and non scheduled groups, and STs and non scheduled groups. The results from the test are presented in table 4.10 in appendix. The figure 2.1 below maps the distribution of the perceived social class among the scheduled groups that encompass the SCs and STs, and the rest of the population. Graphically, the distribution of the perceived status looks more skewed towards higher classes for SCs than for the rest of the population and more skewed towards lower classes for STs.

Table 2.2 presents the distribution of the assumed main determinants of social class across castes [4].

the classes are perceived by the interviewees as some sort of ranking on a scale from 1 to 5 and the labels devoid of the usual sociological meaning, as well as the word "class" although I lack further information on this particular topic. If I am correct that individuals felt they were asked to rank themselves, irrespective of the actual meaning of the classes, that leaves room for subjectivity. This issue is discussed later in section 6.2. Also I insist throughout the chapter that the variable assessed is *perceived* social class, this latter word being understood as a rank rather than a class in a marxist sense

[4]For more clarity they are graphically represented in figure 4.2 in appendix

FIG. 2.1 – Distribution of perceived social class by caste



On average SCs tend to be more educated than STs but slightly less than non-scheduled groups. Pearson's χ^2 whose results are presented in table 4.11 in appendix also conclude that the distribution of education differ according to caste, although only at the 5% level of significance between SCs and non-scheduled groups.

Income is also differently distributed across castes. Non scheduled groups income is gathered in middle ranges while SCs incomes are more spread over the distribution. Hence, the proportion of individuals who declared earning more than 20,000 Rupees a month is 16% among the SCs and 3% among the non-scheduled groups. On average, SCs seem wealthier than other groups, including the non-scheduled one. As expected STs income is gathered around the lower end of the ranges.

As far as occupations are concerned, it would not be unreasonable to assume that the impact of an occupation over social status is linked to whether the position is manual, and whether it implies subordination. The proportion of individuals that occupy non-manual positions is not different between SCs and non-scheduled groups (49% and 44% respectively) while the proportion is lower for STs (26%). The proportion of professionals, which seems to be the highest paying position as evidenced by table 4.12 in appendix is much higher in the SC group than in other groups.

Among white collars, the proportion of managerial positions[5] is the highest wi-

[5]The following occupations are considered as managerial : Employer manager of an establish-

thin the non-scheduled category although it is close for SCs but much lower for STs (29%, 23% and 13% respectively).

To put it all in a nutshell, SCs do not seem to be less well positioned than the non-scheduled group with regard to education, wealth or occupation. They are on average only slightly less educated, occupy similar types of positions and are on average wealthier. The picture for STs is more clear-cut. They are on average poorer and less educated and are overproportioned in manual or subordinate occupations. Given these raw statistics and leaving aside the potential effect of groups, SCs would not be expected to rank very differently than non-scheduled groups, while STs are expected to position at the lower end of the social scale. These conclusions are rather peculiar given the commonly accepted idea that SCs form a largely deprived group that is located at the lower end of the social hierarchy together with Scheduled Tribes. Yet, these expectations may be troubled by caste considerations that have not been, so far, accounted for. Moreover, these descriptive statistics clearly exhibit a divide between SCs and STs.

ment, supervisory non manual office worker and foreman / supervisor

TAB. 2.2 – Distribution of the main variables across castes

	Scheduled Castes	Scheduled Tribes	Scheduled Groups	Non-scheduled Groups	Total
Number of observations	1169	972	2141	1262	3403
Income Range(*)					
Nb. missing obs.	*205*	*217*	*22*	*13*	*435*
% missing obs.	*17.5%*	*22.3%*	*19.7%*	*1.0%*	*12.8%*
Distribution of informed data					
< 500 Rupees / month	7.4%	18.9%	12.4%	1.4%	7.8%
501 - 1,000 Rupees / month	12.7%	11.0%	11.9%	15.1%	13.3%
1,001 - 3,000 Rs / month	21.7%	20.3%	21.1%	35.0%	26.9%
3,001 - 5,000 Rs / month	14.5%	19.1%	16.5%	18.3%	17.3%
5,001 - 10,000 Rs / month	18.4%	15.0%	16.9%	19.9%	18.2%
10,001 - 20,000 Rs / month	9.4%	7.9%	8.8%	7.0%	8.1%
20,001 - 30,000 Rs / month	8.2%	3.6%	6.2%	1.2%	4.1%
30,001 - 50,000 Rs /month	4.8%	2.9%	4.0%	0.6%	2.6%
> 50,000 Rs / month	3.0%	1.3%	2.3%	1.4%	1.9%
Educational level(**)					
Nb. missing obs.	*13*	*7*	*20*	*3*	*23*
% missing obs.	*1.1%*	*0.7%*	*0.9%*	*0.2%*	*0.7%*
Distribution of informed data					
Primary and below	47.1%	65.0%	55.3%	43.1%	50.7%
Secondary School	23.4%	21.1%	22.4%	28.4%	24.6%
Attended college	29.4%	13.9%	22.3%	28.6%	24.7%
Occupation(***)					
Nb. missing obs.	*471*	*366*	*837*	*615*	*1452*
% missing obs.	*40.3%*	*37.7%*	*39.1%*	*48.7%*	*42.7%*
Distribution of informed data					
Employer / Manager	8.7%	2.1%	5.7%	18.5%	9.9%
Professional	19.2%	6.4%	13.3%	9.9%	12.1%
Supervisory office	10.3%	6.1%	8.4%	11.3%	9.3%
Non manual office	7.0%	6.4%	6.7%	4.2%	5.9%
Foreman / supervisor	3.7%	4.6%	4.1%	0.0%	2.8%
Total Manual	*49.0%*	*25.7%*	*38.2%*	*43.9%*	*40.1%*
Skilled manual	8.5%	12.9%	10.5%	7.7%	9.6%
Semi-skilled manual	5.2%	6.6%	5.8%	1.4%	4.4%
Unskilled manual	3.2%	6.6%	4.8%	1.4%	3.6%
Farmer (own farm)	18.2%	29.4%	23.4%	30.0%	25.6%
Agric. worker	8.0%	15.5%	11.5%	6.6%	9.9%
Army	3.2%	1.0%	2.1%	0.0%	1.4%
Never had a job	4.9%	2.3%	3.7%	9.0%	5.4%
Final nb. of informed obs.	567	455	1022	636	1658

(*) household's income

(**) interviewee's educational level

(***) chief wage earner's occupation

2.2 Sampling Issue

It may seem quite peculiar that SCs' characteristics apparently do not differ from those of the non-scheduled groups. It should be recalled that the sampling procedure

was based on voting rolls as already mentioned. Thus, the sample only include individuals aged 18 and more. Moreover, the sample does not include any illiterate individual, which probably is a direct consequence of the sampling procedure. Table 2.3 presents the distribution of individuals across the three educational levels in the WVS and the 2001 Census of India[6]. Please bear in mind that the "attended college" category accounts for all the graduates in the Census while the WVS would recognize in this category anyone who has attended college even without graduating. Threfore, there must be a slight discrepancy between the two samples for this category.

TAB. 2.3 – Comparison of educational levels between the World Values Survey and the Census of India 2001

	World Values Survey ("WVS")			Census of India 2001 : individuals aged at leat 19		
	SC	ST	Non-scheduled groups	SC	ST	Non-scheduled groups
Primary and below	47.1%	65.0%	43.1%	73.4%	76.2%	62.1%
Secondary	23.4%	21.1%	28.4%	21.1%	19.9%	28.2%
Attended college	29.4%	13.9%	28.6%	5.6%	4.0%	9.6%

Note : reconciliation of the categories accounted for in the WVS and in the Census is presented in table 4.13 in appendix

It is noteworthy that individuals are on average more educated in the WVS sample. This may be due to a bias towards urban individuals given that more than half of the sampled individuals live in towns of more than 10,000 inhabitants. Table 2.4 below presents a comparison between the WVS sample and the Census of India, for *urban* individuals aged 19 and more.

TAB. 2.4 – Comparison of educational levels between the World Values Survey and the Census of India 2001 for urban individuals

	World Values Survey ("WVS")			Census of India 2001 : *urban* individuals aged at leat 19		
	SC	ST	Non-scheduled groups	SC	ST	Non-scheduled groups
Primary and below	47.1%	65.0%	43.1%	59.6%	57.2%	45.8%
Secondary	23.4%	21.1%	28.4%	29.8%	31.9%	35.3%
Attended college	29.4%	13.9%	28.6%	10.6%	10.9%	18.8%

The distribution across educational levels by groups is actually quite close between the WVS sample and the Census of India, when the latter is restricted to the urban category. It should be noted from graph 4.3 in appendix that SCs on average live in larger towns than non-scheduled groups for the whole sample and this bias may explain why the SCs characteristics do not seem to differ from that of the non-scheduled groups. Yet, when the sample is restricted to the 2001 survey only, the

[6]The estimates for the Census of India were computed on the same districts's sample as those contained in the WVS. The list of states and the number of districts accounted for in each state are presented in table 4.14 in appendix

distribution between the two groups across town size is probably more balanced[7] and the distribution of groups across educational levels is much closer to that of the Census as shown by table 2.5 below.

TAB. 2.5 – Comparison of educational levels between the 2001 World Values Survey and the 2001 Census of India

	World Values Survey ("WVS") 2001 sample only			Census of India 2001 : individuals aged at leat 19		
	SC	ST	Non-scheduled groups	SC	ST	Non-scheduled groups
Primary and below	74.7%	70.2%	43.1%	73.4%	76.2%	62.1%
Secondary	15.7%	23.4%	28.4%	21.1%	19.9%	28.2%
Attended college	9.6%	6.4%	28.6%	5.6%	4.0%	9.6%

This analysis leads to the conclusions that results ought to be assessed for a urban literate population aged more than 19 at the time of the survey. As mentioned, in the whole sample, SCs tend to live in larger towns than non-scheduled groups and this may introduce a sampling bias. Yet, this eventual bias doe not seem to be so strong in the 2001 sub-sample. Thus I am left with two options. Either I give priority to the number of observations and proceed with an estimation over the whole sample, keeping in mind this potential sampling bias, or I halve the number of observations by keeping only the 2001 sub-sample, and feel greater comfort about the representativeness of the sample. In what follows, I opted for the first alternative, especially given that I perform tests that are quite demanding. Nevertheless, results on the 2001 sub-sample will be discussed later when the effect of the 1995 dummy is commented on, in section 5.1.1.

2.3 Variables Used

Perceived social status takes on values 1 for lower class through 5 for upper class. Castes are represented by three dummy variables for Scheduled Castes, Scheduled Tribes and non-scheduled groups. Main explanatory variables are *education*, *income range* and *occupation*.

Household's income was not recorded as a continuous variable but rather as categorical variable that takes on 9 values according to the income intervals presented in table 2.2. After performing a test on the homogeneity of the distribution of income ranges across classes, it has been concluded that the distributions for ranges 8 and 9 were not significantly different, as well as for range 6 and 7. Similar income ranges were therefore aggregated. Seven income dummies were then constructed to account for the income ranges and are presented in the table 2.6 below :

The same kind of analysis was performed for the chief wage earners' occupations and tests concluded to the homogeneity of the distribution across classes between

[7]Please refer to graph 4.4 in appendix

TAB. 2.6 – Income dummies variables

Range		Number of observations
1	< 500 Rs / month	231
2	501 - 1,000 Rs / month	394
3	1,001 - 3,000 Rs / month	799
4	3,001 - 5,000 Rs / month	513
5	5,001 - 10,000 Rs / month	539
6	10,001 - 30,000 Rs / month	360
7	> 30,000 Rs / month	132

employer and foreman and between unskilled manual worker and semi-skilled manual workers. These categories were therefore aggregated. Thus 10 dummies for each occupation were constructed and the list is provided in the table 2.7 below :

TAB. 2.7 – Occupation dummies variables

Occupation dummies	Number of observations
Employer / Manager / Foreman	248
Professional worker	237
Supervisory non-manual office worker	182
Non manual office worker	115
Skilled manual worker	187
Unskilled / semi-skilled manual worker	156
Farmer cultivating his own farm	499
Agricultural worker	193
Member of armed forces	28
Never had a job	106

As we shall see later, the last category labeled "never had a job" in the data set is rather intriguing. First, the distribution of income within this category, as shown by table 4.12, is rather spread over the ranges, so this group is unlikely to encompass only unemployed, students or housewives, especially as "never had a job" is supposed to describe the occupation of the chief wage earner. Within this category, 100% of the respondents declared that they were not the chief wage earner, and 94% of them declared that the chief wage earner was employed at the time of the interview. Thus this category probably encompasses temporary jobs and/or self-employment or at least occupations that were not clear to the respondent.

Three education dummies were created in accordance to the ranges informed in the database that are : primary education and below, secondary school and attended college. Please bear in mind that the there is no illiterate individual. Other control variables are the standard determinants of social capital, such as sex, marital status age and age squared of the respondent. The size of the town is also included under the assumption that in smaller towns caste identity is more salient and of common knowledge. Thus its impact would be greater. Given that data were collected in 1995 and 2001, a binary variable equals to 1 for the year 1995 was also included.

2.4 Benchmark Scenario

Given that I have a large set of binary variables I need to specify a benchmark scenario. This reference case depicts a situation that is most likely to result in a high social ranking, i.e. a non scheduled individual earning more than 30,000 Rupees a month, who attended college and who is a professional worker. In order to select the benchmark occupation I looked at the distribution of income ranges across occupations, that is presented in table 4.12 in appendix. It appears that being a professional is the highest paying job, thus this occupation was picked.

3 Discriminant Analysis of The Data

In order to sense which variables are most likely to have an impact on perceived social status a discriminant analysis of the data is performed. The aim of this technique is to find a set of functions u_z, called discriminant functions that map a set of predictors x_{ij}, (i identifying the individual and j standing for the characteristic's type such as income, education and so on) into a latent variable y_i^* that is associated with the actually observed social class y_i. The first discriminant function is found so as to best separate the observed groups. The second discriminant function is the second best separating function. The merit of discriminant analysis is to graphically represent the discriminating power of the predictors, that is which characteristic is most likely to result in a specific classification. Variables that stand close to the origin of both functions have little discriminating power while those that are the most far away are likely to be strong indicators of classification[8].

Table 2.8 below presents the four discriminant functions obtained. All 4 are highly significant as testified by the F test. The first dimension $u_1(x)$ explain 77% of the variance in the dependent variable and canonical correlation show a matching score of 64% between the dependent variable, ie. social classes and the first discriminant function. Overall the two first functions explain more than 90% of the dependent variable variance.

Tab. 2.8 – Canonical Linear Discriminant Analysis

	Canonical correlation	Eigen-value	Proportion of the variance explained	F	P>F
$u_1(x)$	0.6404	0.695337	0.7741	13.411	0.0000
$u_2(x)$	0.3329	0.124659	0.1388	4.7269	0.0000
$u_3(x)$	0.2178	0.049802	0.0554	2.8885	0.0000
$u_4(x)$	0.1662	0.028423	0.0316	2.2035	0.0000

Figure 2.2 below plots the coefficients associated to the various independent variables given the two first discriminant axis[9]. Coefficients from the first discriminant function u_1 are plotted horizontally while those from the second function are plotted vertically. The further away the independent variable is from the origin, the more

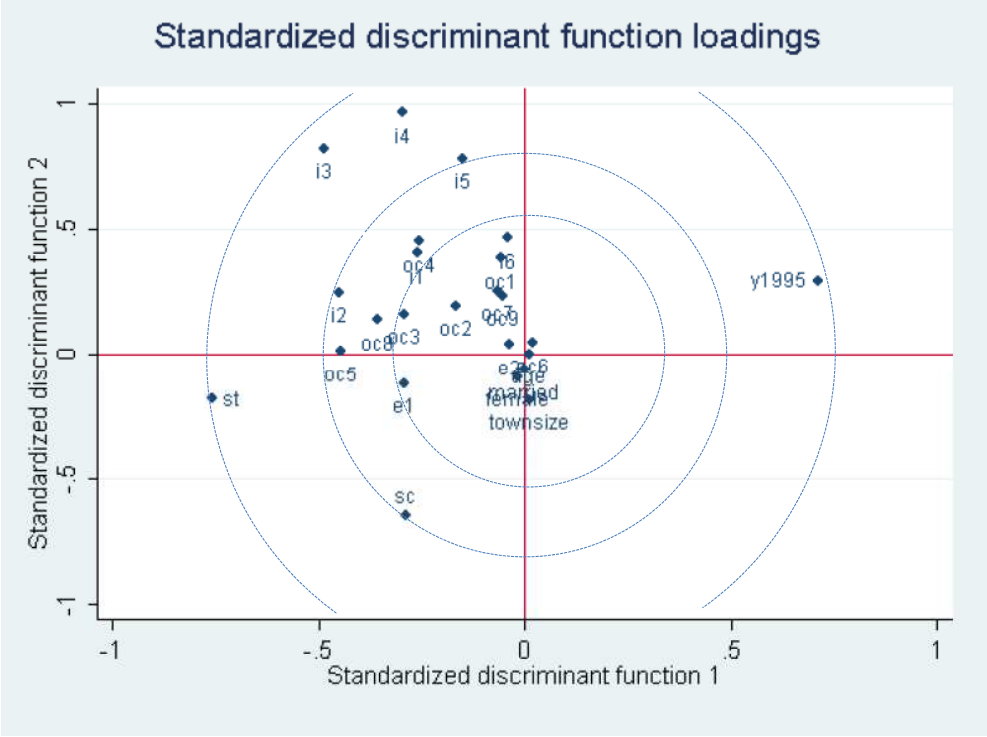
[8] a more formal description of the technique is provided in appendix

[9] Proper coefficients are presented in table 4.15in appendix

discriminating the variable is. Given that I have taken as a benchmark the scenario that most likely induces a high perceived social class, almost none of the independent variables are located in the two right hand side quadrants.

According to figure 2.2 the two main discriminating dimensions are castes and income. By and large, the largest constraint on perceived social class is membership to Scheduled Tribe while the discriminating power of belonging to a Scheduled Caste is somewhat lower, although it remains quite large. Three points can be made. First, caste seems to be the strongest determinant of perceived social status. Second, Scheduled Castes do not perceive their caste membership as binding on social status as Scheduled Tribes do. Third, income ranges 3 and 4 display a stronger discriminating power than membership to Scheduled Castes, while income ranges 2 and 5 have a similar power thereby suggesting that a decrease in income from the highest level to middle range income has a negative effect similar in magnitude to that of being from a Scheduled Caste. However, the income effect can not compete with that of being from a Scheduled Tribe.

FIG. 2.2 – Coefficients from the first two discriminant functions



labels	Plot	labels	Plot
Income range 1 to 6 (1 = lowest)	i1, i2...i6	Agricultural worker	oc5
Education level 1 and 2 (1 = primary)	e1, e2	Member of armed force	oc6
Supervisory non manual office worker	oc1	Never had a job	oc7
Non manual office worker	oc2	Unskilled or semi-skilled manual worker	oc8
Skilled Manual worker	oc3	Employer / Manager / Foreman	oc9
Farmer cultivating his own farm	oc4		

Compared to college attendance, other levels of education as a whole have a relatively low discriminating power. Out of the two educational levels retained, only the first one, i.e. primary and below is not located close to the origin and thus may be thought of as having a negative effect on perceived social status.

Discriminant analysis is particularly helpful to identifying the most relevant occupation with regard to perceived social status. According to the figure 2.2, occupations are not nearly as discriminant as castes and income. Out of the nine occupations, three have relatively strong discriminating power : agricultural worker (oc5 in the graph), unskilled or semi-skilled manual worker(oc8), and farmer cultivating his own farm (oc4). Next comes skilled manual worker (oc3). It is noteworthy that the most discriminating occupations are all manual, while office types of occupations are not so relevant, all of them being compared to being a professional worker. The relevant divide in occupations seem therefore to be manual versus non-manual jobs, although occupations in general does not seem to have a strong explaining power.
Nearly irrelevant variables include town size, gender, marital status, age of the respondent as well as secondary school education, or being enrolled in the army.

Three conclusions may be drawn from the analysis :
- Caste strongly binds perceived social identity although the constraint seems to be harsher on Scheduled Tribes than on Scheduled Castes.
- Income, for intermediate levels, may be almost as powerful in shaping perceived social identity as being from a Scheduled Caste.
- The above proposition does not hold for Scheduled Tribes. In this instance no other determinant seem to be as powerful as the caste effect.
- Occupations and education do not seem to be as discriminating as income and castes are, although manual occupations are generally more binding on perceived social class.

The discriminant analysis presented above is descriptive, yet helpful at putting forth hypothesis, that will be checked through the empirical strategy described in the next section.

4 Empirical Strategy

Given that the dependent variable is ordinal, the analysis resorts to a pooled ordered probit model, whose details are given below.

4.1 Base Model

Let y_i^* be the latent continuous measure of *perceived* social class by individual i defined by the following relationship :

$$y_i^* = \theta caste_i + \beta Income_i + \gamma Occupation_i + \delta Education_i + \rho z_i + \epsilon_i \qquad (2.1)$$

where $caste_i$ is the caste to which individual i belong.
$Income$, $Education$ and $Occupation$ together with castes are the variables of interest as earlier described
z_i is a vector of control variables usual to the literature on social capital such as age, sex and marital status of the respondent together with the size of the town and a dummy for year 1995. ρ is the vector of associated coefficients.
ϵ_i a random error term assumed to follow a standard normal distribution.

y_i is the observed ordinal variable so that for the j^{th} outcome $y_i = j$ for $j = 1...5$ and is determined from the model as follows :

$$y_i = \begin{cases} 1 & if \quad -\infty \leq y_i^* \leq \mu_1 \\ j & if \quad \mu_{j-1} < y_i^* \leq \mu_j \\ 5 & if \quad \mu_4 < y_i^* \leq \infty \end{cases}$$

where μ_i are thresholds to be estimated together with the coefficients. The probabilities for each ordinal outcome is therefore
$P[y_i = 1] = \phi(\mu_1 - x_i\beta)$
....
$P[y_i = j] = \phi(\mu_j - x_i\beta) - \phi(\mu_{j-1} - x_i\beta)$
...
$P[y_i = 5] = 1 - \phi(\mu_{j-1} - x_i\beta)$
for ϕ the standard normal cumulative distribution function. The ordered probit model is estimated for the best and worst case scenarios.

4.2 Conditional Effects

Descriptive statistics have shown that the distribution of assumed determinants of social status such as income, occupation and education significantly differ across castes [10]. In the base specification, I identified the effect of caste controlling for other variables. However, the effect of determinants of perceived social status may differ depending on caste. Therefore caste may also have an effect through the differing weights carried by other determinants. For instance, education may be effective at improving the perceived social status among non-scheduled individuals but not

[10] Please refer to the Pearson's χ^2 test presented in table 4.11 in appendix

among scheduled groups.

In order to investigate this possibility, I first run a likelihood-ratio Chow test to check whether the vector of parameters are equal across all three groups : SCs, STs and non-scheduled groups.

Secondly, I test whether each determinant, income, education and occupation interacted with alternatively and jointly the SC and ST variables are jointly significant. To do so, I proceed with an incremental likelihood ratio χ^2 test.

In the event that one of these determinants, say for instance income, has a differing effect depending on caste, I estimate the base model defined by equation (1.6) including the income variable interacted with the SC ad ST binary variables.

5 Results

5.1 Base Model

Table 2.9 presented on next page displays the results from the estimation of the base specification. In specification (1) scheduled groups are compared to non scheduled groups, while specifications (2) and (3) compares SCs and STs to the rest of the population, controls being included in specification (3).

As expected, being from a scheduled group significantly decreases the likelihood of ranking in high classes. Consistent with the hypothesis brought forward in the discriminant analysis, being from a Scheduled Tribe has a much larger impact on perceived social class than that of being from a Scheduled Caste, although this point will be nuanced in the next section. Group is not the sole determinant of social identity. Income, education and professions seem all to be relevant variables.

Nevertheless, the significance of the coefficients only show that the effect of the variables differ from omitted variables. Should I change the benchmark scenarios, significance may differ. Therefore I need to test whether each parameter differ from the other. For instance, I need to test whether the impact of earning an income included in the first range is different from earning a second range income. This will be performed based on specification (3).

TAB. 2.9 – Determinants of perceived social class - Base Specification

		(1)	(2)	(3)	(4)
Caste	Scheduled groups	-0.592***			
		(0.000)			
	Scheduled Caste		-0.430***	-0.427***	-0.632***
			(0.000)	(0.000)	(0.000)
	Scheduled Tribe		-1.231***	-1.225***	-0.799***
			(0.000)	(0.000)	(0.000)
	1995 x SC				0.748***
					(0.001)
Income	< 500 Rs / month	-0.897***	-0.715***	-0.703***	-0.691***
		(0.000)	(0.000)	(0.000)	(0.001)
	501-1,000 Rs / month	-1.184***	-1.163***	-1.170***	-1.164***
		(0.000)	(0.000)	(0.000)	0.000
	1,001-3,000 Rs / month	-0.949***	-0.928***	-0.938***	-0.933***
		(0.000)	(0.000)	(0.000)	0.000
	3,001-5,000 Rs / month	-0.801***	-0.711***	-0.710***	-0.716***
		(0.000)	(0.000)	(0.000)	0.000
	5,001-10,000 Rs / month	-0.522***	-0.477***	-0.478***	-0.481***
		(0.001)	(0.003)	(0.004)	(0.004)
	10,001-30,000 Rs / month	-0.384**	-0.328**	-0.327**	-0.324**
		(0.017)	(0.042)	(0.046)	(0.050)
Education	Primary and below	-0.387***	-0.343***	-0.340***	-0.337***
		(0.000)	(0.000)	(0.000)	0.000
	Middle school	-0.018	0.012	0.006	0.000
		(0.796)	(0.867)	(0.929)	(0.998)
Occupation	Employer / Manager/ Foreman	-0.202**	-0.14	-0.145	-0.13
		(0.049)	(0.176)	(0.167)	(0.219)
	Supervisory office	-0.277***	-0.220**	-0.211**	-0.197*
		(0.007)	(0.031)	(0.041)	(0.058)
	Non manual office	-0.555***	-0.467***	-0.468***	-0.455***
		(0.000)	(0.001)	(0.001)	(0.001)
	Skilled manual	-0.802***	-0.705***	-0.701***	-0.671***
		(0.000)	(0.000)	(0.000)	0.000
	Semi and unskilled manual	-1.140***	-0.979***	-0.981***	-0.932***
		(0.000)	(0.000)	(0.000)	0.000
	Farmer : own farm	-0.549***	-0.410***	-0.403***	-0.400***
		(0.000)	(0.000)	(0.000)	0.000
	Agricultural worker	-1.209***	-1.046***	-1.063***	-1.010***
		(0.000)	(0.000)	(0.000)	0.000
	Member of armed forces	0.191	0.073	0.06	0.046
		(0.422)	(0.765)	(0.807)	(0.853)
	Never had a job	-0.321**	-0.236	-0.223	-0.209
		(0.029)	(0.117)	(0.155)	(0.185)
Controls	1995 dummy	0.817***	1.031***	1.059***	0.569***
		(0.000)	(0.000)	(0.000)	(0.003)
	Female			-0.004	0.000
				(0.941)	(0.999)
	Married			-0.019	-0.019
				(0.775)	(0.772)
	Age			0.001	0.001
				(0.739)	(0.702)
	town size 2			-0.118	-0.101
				(0.243)	(0.313)
	town size 3			0.028	0.057
				(0.815)	(0.626)
	town size 4			-0.211*	-0.169
				(0.092)	(0.176)
	town size 5			0.024	0.046
				(0.841)	(0.695)
	town size 6			-0.146	-0.128
				(0.197)	(0.254)
	town size 7			-0.076	-0.062
				(0.515)	(0.597)
	town size 8			-0.079	-0.067
				(0.589)	(0.649)
Observations		1658	1658	1653	1653

*Robust p values in parentheses ; * significant at 10% ; ** significant at 5% ; *** significant at 1%*

5.1.1 The 1995 Issue

Before going any further into the analysis of the results, some comments are needed on the salience of the effect of the 1995 dummy. The 1995 round is rather unbalanced as shown by table 4.16 in appendix. During that round, the population only comprised SCs and STs, the latter representing approximately half of the informed observations. This probably explains, only partly as we shall see, the strong effect of the 1995 dummy. Moreover, in the whole sample, SCs tend to live in larger towns which may induce a sampling bias, while the 2001 sub-sample seems to be more balanced. Thus, the analysis conducted below is also run over the 2001 sub-sample and the results are presented in appendix[11].

It should be noted that although the estimation over the whole sample concludes that being and ST has a stronger effect than being an SC on perceived social class[12], in accordance with the description given in the discriminant analysis, such a gap between the two scheduled groups is not found in the 2001 sub-sample (the difference in the coefficients is not significant anymore at conventional levels). Yet when the model is estimated over the 1995 sub-sample, the SC group being the benchmark, such a gap strongly reappears as shown by table 4.17 in appendix.

When the model is estimated over the whole sample but allowing the effect of being an SC to vary according to survey rounds (specification (4) of table 2.9), the SC coefficient is significantly different from that of the interacted term. On the other hand, when the 1995 dummy is interacted with the ST variable instead of the SC variable, its coefficient is not significantly different from the one associated with the ST dummy. This, unfortunately, supports the hypothesis that there is a sizable sampling bias related to SCs, which probably explains why SCs characteristics were not very different from those of the non-scheduled group. Indeed the Scheduled Caste effect is much stronger in the 2001 sub-sample. This bias also may partly explain the large 1995 effect, given that in specification (4) the coefficient associated with the 1995 dummy is halved, although its impact remains large and significant, which suggests that only a part of the problem has been removed[13]. This is the reason why I proceed with the same kind of analysis as below on the 2001 sub-sample. To save space and clarity, results are presented in appendix, although some comments on them will be included in the course of the chapter. [14]

[11] pages 162 to 168

[12] The difference in the coefficients associated with the SC and ST variables is significant at a 1% threshold (χ^2 at 97.62) and is estimated at 0.7976

[13] Another reason for the potential large effect of the 1995 dummy may be that the two rounds were badly reconciled

[14] The differing effect of being an SC between 1995 and 2001 is not devoid of information. Assuming that sampled SCs had better characteristics in 1995 than in 2001, as it seems to be the case, and the fact that caste membership has a smaller effect in the 1995 sample concur with the view that improvements in characteristics may partly cancel the Scheduled Caste effect.

5.1.2 Tests on Coefficients and Thresholds for Each Variable Type

Education

Results show that the impact of secondary school attendance is not different from that of the omitted category, that is university attendance. Having only primary education has a significant negative impact on perceived social status. Thus, the real divide lies between primary education and above. The test of the equality of coefficients associated with secondary school and primary do conclude that they differ ($\chi^2 = 22.02\,;\ P > \chi^2 = 0.000$). The two upper educational levels may and will therefore be aggregated into one new variable that will be the omitted one from now on[15]. It should be noted that acquiring education beyond primary can only counterbalance half of the effect of being from an SC or an ST. Out of the four attributes identified as contributing to perceived social class that are groups, income, occupation and education, the latter has the smallest effect.

Occupation

Being enrolled in the army, an employer and not being occupied are not significant, meaning that their impact on perceived social status is not different from that of being a professional worker (the omitted category). The results from the test of equality of the parameters associated with each of these variables are provided in table 2.10 on next page. From this test it can be concluded that parameters do not differ across these three occupations, namely being a professional, an employer, in the army or without a job. Therefore, they are aggregated into one variable named *occupation*1. This category makes more sense than it appears. As already mentioned, being a professional is probably the most well regarded position, given that all other compares unfavorably to it as shown by the negative coefficients associated with occupations. It is also the highest paying occupation[16]. Second, it can easily be understood why being in the army or an employer may be valued, besides providing relatively high incomes. The case of "never had a job" is more peculiar, as mentioned earlier. The fact that its impact is similar to other supervisory occupations supports the hypothesis that this category is mainly comprised of self-employed individuals.

The impact of being a supervisory office worker does not significantly differ from the *occupation*1 group when the model is reassessed[17] and is therefore incorporated into it. *occupation*1 becomes the omitted category. The reason that prevented from doing so in the first step was the significant difference in parameters between this occupation and being a professional worker. Yet, such a difference does not prove significant anymore and I feel authorized to combine the variables.

Table 2.10 shows that the coefficients associated with being a non manual office worker and cultivating one's own farm do not differ. They are therefore combined to form a new variable *occupation*2. Please note that being an office worker does not have a significantly differing impact compared to cultivating own one's farm. Yet

[15]Please note that the analysis over the 2001 sub-sample leads to the same conclusions.
[16]please refer to table 4.12 in appendix for income distribution across occupations
[17]please refer to table 4.26 in appendix

the difference between being a cultivator and a skilled manual is significant. Thus I did not incorporate this last activity into *occupation*2. For the sake of clarity the variable skilled manual is renamed *occupation*3. Table 2.10 also shows that there is no difference in the effect of being a low skilled manual worker and an agricultural laborer. Thus these two occupations are merged to form the variable *occupation*4.

TAB. 2.10 – χ^2 test of difference in parameters - occupations

	Employer / Manager	Supervisory office worker	Non manual office worker	Skilled manual worker	Semi and unskilled manual worker	Farmer own farm	Agricultural laborer	Member of armed forces	No job
Employer /		0.48	5.73**	19.76***	43.69***	7.16***	45.48***	0.72	0.28
Manager		(0.488)	(0.017)	(0.000)	(0.000)	(0.007)	(0.000)	(0.398)	(0.599)
Supervisory office			3.55*	14.61***	35.23***	3.61*	36.84***	1.25	0.01
			(0.060)	(0.000)	(0.000)	(0.057)	(0.000)	(0.263)	(0.943)
Non manual office				2.30	11.39***	0.25	14.25***	4.16**	1.96
				(0.129)	(0.001)	(0.618)	(0.000)	(0.041)	(0.162)
Skilled manual					3.86**	6.37**	6.09**	8.84***	8.36***
					(0.049)	(0.012)	(0.014)	(0.003)	(0.004)
Semi / unskilled						25.40***	0.33	16.72***	21.09***
manual						(0.000)	(0.565)	(0.000)	(0.000)
Farmer : own farm							31.23***	3.59*	1.72
							(0.000)	(0.058)	(0.190)
Agricultural								18.70***	24.73***
laborer								(0.000)	(0.000)
Member of									1.09
armed force									(0.296)

Robust p values in parentheses ; *significant at 10% ; ** significant at 5% ;*** significant at 1%

The table below summarizes the correspondence between the original variables and the new aggregates.

TAB. 2.11 – New occupation aggregates

Aggregate	Corresponding occupations
Occupation 1	Professional worker
	Employer / Manager / Foreman
	Supervisory office position
	Member of armed force
	"Never had a job"
Occupation 2	Non manual office worker
	Farmer : own farm
Occupation 3	Skilled Manual
Occupation 4	Semi or unskilled manual worker
	Agricultural laborer

These groups can be intuitively ranked. While the first group encompasses mainly clerical and supervisory position, the second one represents a second tier, while the last ones are probably the least desirable. Thus, coefficients would be expected to be negative, given that the omitted category is the first group and decreasing with the occupational rank. The estimates for the differences between coefficients associated with the occupation groups is presented in table 2.12 below :

TAB. 2.12 – Estimates of the difference in coefficients - occupation groups

$\beta_{occupation_j} - \beta_{occupation_{j+1}}$			
	j = 1	j = 2	j = 3
j + 1	0.283***	0.288**	0.323**
	(0.000)	(0.012)	(0.011)

p values in parentheses ; *significant at 10% ;
** significant at 5% ;***significant at 1%

Given that the gaps between the coefficients is close to a constant, the variable occupation is recoded as a categorical variable that tales on value 1 for *occupation*1, 2 for *occupation*2 and so on up to 4 for *occupation*4. It is believed that such a transformation is not going to greatly alter the estimations but prove very useful to reading tables and estimating conditional effects.

The above results exhibit where the divides lie in occupations types as far as perceived social status is concerned. Broadly speaking, occupations lying at the bottom of the scale all relate to unskilled work and do not require any form of capital, be it physical or human. Acquiring skills or capital spurs a move from the bottom category to the next, which leads to an improved social image. Next threshold entails obtaining a managing position which has the largest positive impact on perceived social

status. Even more globally we may speculate that the three factors that determine social status are in order of importance, capital, either human or physical and power.

Going down to earth and back to a stricter interpretation of the results, it is important to highlight that acquiring land may be a way to counterbalance the Scheduled Caste effect. Indeed becoming a farmer from an agricultural laborer has an effect estimated at 0.61 which is larger than the SC effect assessed at 0.43. Moreover, for a manual worker, acquiring skills has also an effect close in magnitude to that of being from a Scheduled Caste. More generally, a SC has to shift over two occupation ranges to offset the caste effect. On the other hand, a Scheduled Tribe would not manage to clear the group effect by moving even from the least to the most desirable group.

Unfortunately the above conclusions may be too optimistic with regard to the estimates over the 2001 sub-sample. Indeed, given that in the whole sub-sample the SC and ST effects are under- and over-estimated respectively compared to the 2001 estimates, SCs as well as STs have to acquire a managing position to cancel the scheduled group effect. Moving from the least desirable category, (agricultural work) to the next (manual and non manual office work) can not fully compensate for the scheduled group effect, although the magnitudes of the two impacts are quite close.

Income

A similar analysis is run for income ranges. First, equality of coefficients associated with the various income ranges is tested. Second, differences in coefficients will be estimated and commented.

Income ranges all have a significantly differing effect from the omitted category, which is the 7^{th} range, i.e. earning more than 30,000 Rupees a month as testified by table 2.9. Equality of coefficients among income variables is tested and the matrix of the results is presented in table 4.22 below.

TAB. 2.13 – χ^2 test of difference in parameters - income

	Income 1 <500Rs.	Income 2 501-1,000Rs	Income 3 1,001-3,000Rs	Income 4 3,001-5,000Rs.	Income 5 5,001-10,000Rs.	Income 6 10,001-30,000Rs
Income 1		9.09***	2.96*	0.00	3.27*	8.52***
		(0.003)	(0.086)	(0.992)	(0.071)	(0.004)
Income 2			4.39**	14.33***	32.60***	41.80***
			(0.036)	(0.000)	(0.000)	(0.000)
Income 3				6.91***	30.40***	41.61***
				(0.009)	(0.000)	0.000
Income 4					8.06***	18.59***
					(0.005)	(0.000)
Income 5						3.81*
						(0.051)

Robust p values in parentheses ; *significant at 10% ; ** significant at 5% ;***significant at 1%

First, all ranges have a differing effect except ranges 1 and 4. Yet, given the gap

between the two ranges, it would make little sense to aggregate them. Differences in parameters are estimated and presented in table 2.14 below. It is noteworthy that the intervals between the parameters are globally equal to a constant, except for the lower range. The fact that switching from the lowest income range to the next induces a negative effect on perceived social status is at odds with common sense and probably highlights the specificity of the situation. Thus it has to be separately accounted for. Besides the lowest range, given that the gaps are more or less equal to constant, it seems sensible to recode the variable as a categorical one in the same fashion as done for occupations, yet I need to control for the specific category that is range 1. It is proposed to include in the estimation the categorical variable for income taking on value 1 for the lowest income range up to 7 for the highest, together with a dummy that takes on value 1 if the individual earns an income located in the lowest range to account for the fact that situation is peculiar. Such a transformation should not greatly alter the results and will again prove helpful in reading tables and estimating conditional effects.

TAB. 2.14 – Estimates of the difference in coefficients - income ranges

$\beta_{income_j} - \beta_{income_{j+1}}$						
	j = 1	j = 2	j = 3	j = 4	j = 5	j = 6
j + 1	0.461***	-0.24**	-0.22***	-0.232***	-0.167*	-0.327**
	(0.003)	(0.036)	(0.009)	(0.005)	(0.051)	(0.051)

p values in parentheses ; *significant at 10% ; ** significant at 5% ;*** significant at 1%

Going back to the effects of changes in income, they are close in magnitude to that of switching from an occupation category to the next, which makes sense given that the two are probably correlated. It is noteworthy that occupation plays a role of its own in shaping social status, even when I control for its income generating characteristics. With respect to income, an SC has to increase its earnings by two ranges to cancel out the Scheduled Caste effect. Although relatively large (about 5,000 Rupees a month), such a move is not out of reach, especially bearing in mind that the average income in India was about 3,000 Rupees a month in 2008[18] although, given that this is a national average it may hide strong disparities between urban and rural areas. As a comparison, the World Bank set the poverty line in 2005 at 648 and 429 Rupees a month for urban and rural areas respectively. The Indian Planning Commission, using monthly per capita expenditures, set the poverty threshold at 356.35 Rupees for rural areas and 538.60 Rupees for urban areas. Thus going out of poverty to the average level of income could potentially cancel out the burden on social image of being an untouchable. STs situation is much more difficult, given that they have to see their income increase thirty fold to cancel out the effect of coming from a tribe on perceived social status.

There again, results may be too optimistic as far as SCs are concerned and too pessimistic as far as STs are concerned. Estimates from the 2001 sub-sample show that both SCs and STs have to switch three income range to reverse the scheduled

[18]source : Central Statistic Organization, Government of India

group effect. In practical terms, this means that they have to see their income increase from 1,000Rs or less to more than 5,000Rs per month or to earn more than 10,000Rs. As a comparison, Banerjee and Piketty (2005) assessed, based on tax returns data in 1999-2000, that the top percentile earned approximately 7,300Rs and more per month[19]. The top 0.5% of the population, earn more than 12,000Rs a month, so the jump needed is quite large.

To summarize the findings of this section[20], four points can be made. First, caste seems less a burden on perceived social status for Scheduled Castes than for Scheduled Tribes, although this may be driven by a potential sampling bias. Second, the most effective way to improve perceived social class and to cancel the scheduled group effect is an improvement in the occupational status, and more particularly the acquisition of a managing position. Third, relatively large sifts in income are needed to reverse the scheduled group effect. Fourth, education has a relatively modest impact on perceived social class and provided it is beyond primary school.

However, by comparing the effects of castes to that of other variables, I made the implicit assumption that other determinants of social identity have a similar effect across castes. This assumption may not be tenable. It would be of some interest to investigate whether caste may modify the impact of income, education or occupation. In this event, caste would not only have an impact of itself but also through the alterations of the effects of other variables.

5.1.3 Conditional Effects

In order to address this issue, I will first test whether the set of coefficients from the base model is the same among the three groups, Scheduled Castes, Scheduled Tribes and non scheduled groups. A likelihood-ratio Chow test obtained by fitting the model for each of the three groups and then comparing the results with those of the base model estimated over the whole sample concluded that the parameters vectors do significantly differ across castes at the 1% level of significance (likelihood ratio $\chi^2 = 84.24$). The same test also concludes that coefficients differ between scheduled and non scheduled group (likelihood ratio $\chi^2 = 36.08$ significant at 1%) and between the sc and st ((likelihood ratio $\chi^2 = 48.15$ significant at 1%). Determinants of perceived social class may therefore not have the same effect within every group. For instance, income may be effective at increasing the perceived social status of members of the non scheduled group but irrelevant for scheduled groups members.

The same test performed on the 2001 sub-sample yield contrary results. Given the small sizes of the SCs and STs populations, I was only able to compare scheduled and non-scheduled groups. The test concludes that the effect of other characteristics, besides groups' membership, does not vary across groups. However, we may have come up against lack of data.

[19]The exact number is 87,633Rs a year. Four millions individuals fall into the top percentile

[20]A table comparing the results obtained from the whole sample and the 2001 sub-sample is presented on page 168

Going back to the whole sample, the three main determinants of perceived social status that are education, income and occupation are interacted with the SC and ST dummies. Results are presented in table 2.15. Specification (1) presents the results from the basic specification after aggregating the variables. Castes coefficients are little changed from the estimation presented in table 2.9 and coefficients associated with the income and occupation variables are in line with the estimates from table 2.14 and 2.12 respectively, all these elements providing some comfort about the innocuousness of the transformations.

TAB. 2.15 – Estimations results - Conditional Effects

		(1)	(2)	(3)	(4)	(5)
Caste	Scheduled Caste	-0.437***	-0.439***	-0.017	-0.326*	0.439
		(0.000)	(0.000)	(0.936)	(0.069)	(0.181)
	Scheduled Tribe	-1.245***	-1.217***	-1.022***	-1.221***	-0.761**
		(0.000)	(0.000)	(0.000)	(0.000)	(0.021)
Income	Income	0.223***	0.224***	0.288***	0.223***	0.314***
		(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
	Income x SC			-0.119**		-0.161***
				(0.018)		(0.004)
	Income x ST			-0.074		-0.101*
				(0.169)		(0.085)
Education	Education ($\leq$ prim.)	-0.346***	-0.330***	-0.339***	-0.346***	-0.271**
		(0.000)	(0.001)	(0.000)	(0.000)	(0.011)
	Education x SC		-0.001			-0.082
			(0.994)			(0.578)
	Education x ST		-0.054			-0.135
			(0.697)			(0.362)
Occupation	Occupation	-0.296***	-0.296***	-0.296***	-0.277***	-0.241***
		(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
	Occupation x SC				-0.05	-0.122
					(0.453)	(0.104)
	Occupation x ST				-0.007	-0.038
					(0.923)	(0.613)
Lowest Income Dummy		0.671***	0.672***	0.613***	0.672***	0.607***
		(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Observations		1653	1653	1653	1653	1653

Robust p values in parentheses ; *significant at 10% ; ** significant at 5% ;*** significant at 1%
Specifications include control variables such as dummy for year 1995, age, gender, marital status and town size

Results prove that the effect of education and occupation does not differ across groups. All the comments made above about the fact that acquiring land for agricultural workers or skills for craftsmen or obtaining a supervisory position may cancel the SC effect still hold. On the other hand, the effect of income interacted with the SC variable and to some extent the ST variable is significant and negative. Two interpretations can be brought forward. Either high income reinforces the already negative caste effect, or being from a scheduled group partially softens the income effect. While none of these hypothesis may be ruled out on econometric grounds, the first one does not intuitively make much sense. Let's retain for now the hypothe-

sis that being from a scheduled group partially neutralizes the income effect. This would mean that caste or tribe may have an impact of its own or/and also through a diminished income effect. This is what seems to be happening. As soon as the income effect is allowed to vary between groups, the coefficient associated with the Scheduled Caste variable looses significance. This would imply that, as far as SCs are concerned, the caste effect mainly runs through a reduced effect of income. The insignificance of the coefficient associated with the SC variable pleads in favor of the second explanation. A couple of words need to be said about the insignificance of the income variable interacted with the ST variable (specification (3)). As already mentioned, income may be correlated with occupation and to some extent education. Thus the income variable will probably feel the effects of not allowing education and occupation to vary across groups. When this last procedure is allowed, (specification (5)), the interaction of income and ST recovers significance, though only at the 10% threshold. This last specification is probably the most relevant of the two and will be focussed on.

One of the reasons for the canceling out of the SC effect and the negative sign of income interacted is that SC do not declare themselves in the high social positions their income would induce but rather in lower position due to their caste identity. In this instance the caste effect does not have an impact of its own but rather manifests itself through the reduced likelihood for wealthy SCs to perceive themselves as belonging to high social classes due to their caste membership. This process is often referred to as cognitive dissonance in social psychology. The concept describes a situation experienced by an individual that challenges his self-image and as such generates anxiety. Subjects need to move out of the conflict and they may do so by repressing the contradictory situation [21]. This process may help at explaining why SCs who are as well endowed with wealth or education as scheduled groups, as descriptive statistics suggested, still do declare themselves in a relatively low position, compared to the non-scheduled groups. Fortunately, the picture is not so dark. Even if income has an additional negative effect among the SCs, the overall income effect is likely to be positive, although almost half that of non scheduled groups. Compared to non scheduled groups, SCs will have to increase twice as much their income to feel that they belong to the same social class as non scheduled groups.

On the contrary, the direct group effect is rather robust for the STs. Coefficients associated with the ST variable retains its significance, while the effect of income on improving perceived social status is negative when interacted with ST. This group suffers from a double effect. Not only does the tribal origin imposes a direct constraint on the perceived social status, but it also has a indirect one through the diminished effect of income. ST individuals do declare themselves in a lower position than their income would suggest because of their tribal origin.

[21] for more information on this and the related concept of stereotype threat, please refer to section 2.1.5 of the general introduction

5.2 Summary of Main Results

Group membership is a strong determinant of perceived social class. Nevertheless, caste or tribe are not the sole determinants of perceived social class and occupation, income and to some extent education all exhibit a relevant impact. Being from a Scheduled Caste or Tribe has a relatively strong effect, especially given the fact that large increases in income or the acquisition of a managing position can reverse the groups' effects, while education can not. The analysis of the whole sample concludes that income has a reduced impact on perceived social class among scheduled groups, a result that echoes the findings of the stereotype threat literature. This conclusion is somewhat tempered by the analysis of the 2001 sub-sample, although it may have come up against data scarcity.

6 Potential Issues

6.1 Local Environment

One of the dimension that is missing in the analysis is the respondent's environment and most notably the local composition of the villages. Indeed it could be argued that in villages that are extremely homogenous in terms of castes, say for instance untouchables villages, social identity rests much more on other economic variables while caste may be less salient. Unfortunately there is little I can do, given that the only information about the respondent's location available is the state. As a robustness check state fixed effects were included (specification (2) of table 2.16 on next page) and can be compared to the base specification reproduced for convenience in column (1). The percentage of SCs and STs in the state's population[22] was included in the base equation as a control variable (specification (3)) as well as their quadratic terms to capture potential non linear effects (specification(4)) and are then interacted with the caste variables (specification (5)).

The inclusion of state fixed effects did not modify the results to a large extent. The results are robust to the inclusion of the state's percentage of SCs and STs as coefficients are hardly modified by this inclusion. Only the percentage of STs in the population is relevant and has a U-shaped effect as shown by specification (4). However, the coefficient associated with the SC variable largely decreased after the inclusion of the interacted terms. This provides some support to the hypothesis that the caste effect does probably depend on the local social composition. The coefficient associated to the interacted term is positive although not significant at conventional levels. The lack of significance probably stems from the crudeness of the measure which is the state's population composition, whereas local information would be more appropriate. It would not be too surprising to see finer measures becoming significant. Nevertheless, coefficients tend to indicate that the tendency to rank in high social classes increases with the representation of the individual's caste or tribe. The lack of information on the local social composition in terms of groups is definitely a limitation of this piece of work. Yet, results probably do not have to be entirely reconsidered since after these robustness checks, signs and

[22] This information comes from the 2001 Census of India

significance levels remain[23].

TAB. 2.16 – Robustness Checks

	(1)	(2)	(3)	(4)	(5)
Scheduled Caste	-0.437***	-0.518***	-0.432***	-0.443***	-0.712***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)
Scheduled Tribe	-1.245***	-1.374***	-1.248***	-1.253***	-1.333***
	(0.000)	0.000	(0.000)	(0.000)	0.000
% SC in state's population			-0.213	-2.894	-0.742
			(0.708)	(0.312)	(0.288)
% ST in state's population			0.932*	-1.435	0.684
			(0.064)	(0.314)	(0.213)
(% SC in state's population)^2				7.024	
				(0.399)	
(% ST in state's population)^2				10.411*	
				(0.073)	
% SC in state x SC					1.541
					(0.151)
% ST in state x SCT					0.885
					(0.409)
Income	0.223***	0.252***	0.224***	0.226***	0.220***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Below primary	-0.346***	-0.371***	-0.364***	-0.366***	-0.370***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Occupation	-0.296***	-0.290***	-0.294***	-0.296***	-0.293***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Lowest Income Dummy	0.671***	0.659***	0.707***	0.699***	0.721***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
State fixed effects	No	Yes	No	No	No
Observations	1653	1653	1653	1653	1653

Robust p values in parentheses ; *significant at 10% ;**significant at 5% ; *** significant at 1% ;
All specifications include other control variables such as year 1995, age, gender, marital status and town sizes.

6.2 Subjectivity

It could be objected to the analysis that perceived social status is subjective and that subjective measures induce, as mentioned by Clark and Oswald (2002), three difficulties : ordinality, scaling and omitted dispositions. The problem of scaling relate to the fact that different individuals may have different mental scales that prevent from treating their answers as cardinal value. For instance, an individual may assess the distance between middle lower class and working class differently from another. The issue of ordinality arises when ranking of the answers is heterogenous and ambiguous. Given that I am only concerned with ordinality and not cardinality of the dependent variable (indeed the distance between the classes is irrelevant to the analysis) and resort to an ordered probit model whose outcomes are

[23]In a separate exercise, specifications (1) through (5) have been estimated while allowing for the SC effect to vary depending on survey rounds (similar method as the one presented in specification (4) of table 2.9). This procedure yields similar results than the one presented above, except for the size of the groups' coefficients. Thus the comments made in this section still hold for these specifications

easy to rank (it is believed that the ranking of social classes is obvious), the first two difficulties of ordinality and scaling are overcome.The omitted disposition problem is somewhat more tricky. If the perceived outcome is assumed to be correlated with individuals tempers that may in turn affect explanatory variables, I am left with an omitted variable problem. As Clark and Oswald (2002) puts it "cross-section equations will be unreliable whenever unobservable characteristics (like a person's natural cheerfulness) are correlated with observable characteristics (like education)". On this particular point I would rely on Clark and Oswald (2002), whose conclusions are "in happiness research, the biases in cross section patterns may be less dramatic than has sometimes been supposed".

It could also be objected that the declared social class may not correspond to reality. Three arguments could be made to tackle this issue. First, I want to insist that there can not be any sort of objectivity in the definition of social class. Even when researchers in sociology or statisticians try to match populations with social classes, they have to make a judgement call about the class segmentation, which necessarily brings in subjectivity. It is true that some elements allow to assess the sociological distance between individuals, such as income, lifestyles or education and according to such distances, clusters may be identified. Yet, the sociological distance is a continuum and where one class should start and the other end is a subjective decision. Therefore, I would argue that there are no "real" or objective classes. Second, given that the question about classes was translated, it is very likely that respondents felt they were asked to rank themselves on a scale did not attach too much importance on the strict definition of the word "class". Third, it should be stressed that my analysis focuses on *perceived* social class and the question as to whether this perception is in conformity with some sort of reality is irrelevant. My interest lies mainly in analyzing whether a determinant of social class has the same effect depending on identity. So the processes that are investigated are entirely subjective.

6.3 Peer Control

Another important point that is also missing in the analysis is peer control. Declared perceived social rank may differ when it has to be publicly revealed and when it is confided to the interviewer potentially due to "stereotype threat" mentioned in introduction. One could easily imagine that an untouchable would depreciate its social class if he had to announce it in front of higher castes. My results which are based on data collected during face to face interviews, where the interviewer did not reveal his identity, should therefore be interpreted with care and I have tried to insist on the fact that I am concerned with the individual's perceived status. The intuition though is that peer control would exaggerate the caste effect.

It would definitely be of great interest to assess potential discrepancies between the perceived social status and the one publicly declared. Akerlof and Kranton (2000) showed that social identity is highly dependent on the actions undertaken by others. Thus we may think that such a discrepancy between the self perceived social identity and the declared one, probably exists and as noted by previous authors are a source

of anxiety.

Moreover, it would be valuable to investigate the perception others have of ego. Indeed, I would hypothesize that discrimination is multi faceted and does not uniquely stem from a one-way act imposed by a discriminator. We may actually think of at least three sources of discrimination : (i) an internalized idea about one's status that is not necessarily confronted with others' opinions (and this is what is investigated in this chapter), (2) an idea an individual may have about himself that is declared and thus may be approved or contradicted by others and (3) and how others assess the identity of this individual. Arguably, these are the three main components of discrimination and disentangling the three would prove an interesting area for future research.

6.4 Religion

As mentioned in section 2.1 the analysis is restricted to the Hindu population, given that information about castes is not available for other denominations. Given that presumably caste is not so salient among other denominations, the group's effect may be overestimated with respect to its effect over the whole population.

The inclusion of religion in the forming of perceived social status poses questions that are both compelling and fraught with consequences, especially in the context of rising religious tensions in India. The first one wonders whether religious identity may supplant caste identity and under what circumstances. There are many possible factors for identity in India such as religion, caste, language, geography etc. How come that one becomes more salient than another ? Suppose that religious identity prevails. In this case, analyzing social fractionalization along the lines of caste to determine its impact on a lack of cooperation does not seem relevant. Secondly, if religious denomination has a strong impact on perceived social status, besides wealth, education, castes or occupations, then claims from religious groups, that may prompt social tensions, may be better assessed. To sum up, understanding the rise of a specific identity at the expense of others may prove quite fruitful and is left for future research.

7 Conclusions

Scheduled Castes do not seem to be less well endowed with education, income or prestigious occupations than non-scheduled groups as descriptive statistics have shown. On the other hand, Scheduled Tribes earn less, are less educated and occupy less prestigious occupations. Logic would command that SCs classify themselves similarly to the non-scheduled groups. This would be without accounting for caste. Caste is a strong determinant of social status in India, yet it is not the only one. Occupations, income and to some extent education are all relevant factors of perceived social class. Nevertheless, the caste effect is quite strong given the fact that large increases in either income or occupational status are necessary to reverse it. Being a Scheduled Tribe has a similar effect as being an SC and the same conclusions hold

for this group as well, except that the way they perceive their social status, not only is depressed by their tribal origins, but also by reduced endowments.

It has been shown that even when social class is declared privately, castes and tribes have a strong effect, which suggests that a depreciated self-image has been internalized. I have argued that if class had been declared publicly, the group's effect would have been even stronger,as experiments about stereotype threats have shown. We may also inquire what would be the judgements made by others about the social status of the individual be and what would be the impact of castes and tribes on it. It could be hypothesized that the joint influence of these three elements is what constitutes discrimination. Discrimination has often been viewed as one-way act imposed by a discriminator, but this may only be the tip of the iceberg and social identity ought to be included in the analysis of discrimination. These investigations are left for future research.

Chapter 3

Is Blood Thicker Than Water? Untouchability and Public Infrastructure

Untouchability is abolished and its practice in any form is forbidden. The enforcement of any disability arising out of "Untouchability" shall be an offence punishable in accordance with the law

Constitution of India ; Fundamental Rights ; Article 17

1 Introduction[1]

The Constitution of India that came into force in 1950, three years after independence outlawed caste based discrimination and abolished untouchability that has been on for centuries in India. The caste system forbids contacts with lower castes, and has resulted in practices referred to as untouchability, while the so stigmatized low castes members are called untouchables that encompass both Scheduled Castes and schedules tribes (hereafter "SCs" and "STs"). The Constitution, on which the Indian legal system rests, has placed on the State the responsibility for improving the welfare of untouchables. For more than 60 years, Indian governments have spared no effort to design and implement policies dedicated to SCs and STs, such as the controverted reservation of administrative positions, parliamentary and assembly seats and access to universities, in accordance with the 46th article of the Directive Principles of State Policy that enounces that "the State shall promote with special care the educational and economic interest of the weaker sections of the people and, in particular, of the Scheduled Castes and the Scheduled Tribes, and shall protect them from social injustice and all form of exploitation". Policies directed at SCs and STs have mainly focussed, besides reservations, on improving access to education and poverty alleviation programs in the forms of grants and credit. Yet, these domains are not the sole where SCs and STs are at a strong disadvantage because of their caste membership. They have been often denied access to public infrastructure on the ground that they are untouchables. Although some efforts have been made to improve SCs and STs access to common infrastructures such as roads, water sources or electricity, evidence show that universal and equal access to public goods is far from being achieved (Anderson (2007), Tiwary (2006)) and that efficient policies in this area have been too few. This situation does not only arise from unequal wealth distribution across castes but also from caste based discrimination. For instance, Shah et al. (2006) presents the results from a survey conducted in 2001-2002, in 565 villages of 11 states and show that, in nearly half of the surveyed villages, untouchables were denied access to water facilities. In 28% of them they were denied entry into police stations and in 18% access to public roads or entry to primary health centers. Indeed, caste prescriptions prohibit the sharing of some common resources, the most salient example being the sharing of water. The Constitution of India, recognized this issue as its 15th article of the Fundamental Rights states that "no citizen shall, on grounds of religion, race, caste, sex, place of birth or any of them, be subject to any disability, liability, restriction or condition with regard to (a) access to shops, public restaurants, hotels and places of public entertainment ; or (b) the use of wells, tanks, bathing ghats, roads and places of public resort maintained wholly or partly out of State funds or dedicated to the use of the general public [...]".

[1]This chapter was written in collaboration with Mathieu Couttenier, Université Paris 1

The aim of this chapter is twofold. First, untouchability practices will be evidenced as access to water sources is shown to have an impact on the number of acts of violence against untouchables. This result highlights the necessity to look into untouchables' access to public goods especially given the constitutional objectives mentioned above. Second, our results, based on a new database on acts of violence against SCs and STs, collected by the National Crimes Record Bureau show that (i) common water sources, such as tanks and wells increase the proportion of crimes committed against the SCs and STs, (ii) while more individualized sources such as tubewells are effective at reducing the number of violent acts. We shall come back in a subsequent section to what is defined as common and individualized sources. All these results are robust to the inclusion of many district and states controls. These analysis reveals that practices of untouchability are still vigorous and that governments water improvement programs have the nice side effect of alleviating if not the causes at least the symptoms of social tensions. This is, to the best of our knowledge, the first large scale attempt to quantify and evidence the phenomenon of untouchability and caste based restrictions attached to the use of public goods.

The chapter is structured as follows : section (2) explains why water may be viewed as a source of caste based conflicts. Section (3) show how this study falls in line with research on social identity and its relationship with conflicts and the provision of public goods. Section (4) presents the data and section (5) the empirical strategy, while results are commented in section (6). Section (7) concludes.

2 Ritual Pollution Through Water

2.1 Castes and Ritual Pollution

As briefly mentioned in introduction to this dissertation, the concept of ritual pollution governs relations between different castes. It is central to the institution. As Srinivas (1974) puts it : "every type of inter-caste relation is governed by the concept of pollution. Contact of any kind, touching, dining, sex and other relations between castes which are structurally distant results in the higher of the two castes being polluted [...] Where contact does result in pollution, however, the polluted member of the higher caste has to undergo a purificatory rite in order to be restored to normal ritual status. Such a purificatory rite is fairly simple where the structural distance between the castes is not very great and the type of contact is not serious. Sometimes, as when a Brahmin eats food cooked by an Untouchable, the resultant pollution is so great that he or she has to be excommunicated". Given untouchables very low status, structural distance between untouchables and the rest of the population is probably one of the largest.

The ritually polluting nature of Tribes is disputable. As already mentioned, two cases need to be distinguished. Some tribes actually converted to Hinduism and entered the caste system. Whether their contact is polluting to higher castes members depends on where they managed to place themselves in the local caste hierarchy. In some instance, they did not rank higher than the untouchables and are therefore as untouchable. In a second case, they remained outside the caste system and as

such, from a higher caste point of view, their contact is polluting. Given that the tribes we are concerned with are scheduled to benefit from reservations, their social backwardness was recognized and they are likely to pertain to the second case[2]. Although it is important to distinguish between the tribes and the lowest castes, for they are ethnographically distinct groups, based on the assumption that Scheduled Tribes are likely to be outcasts, they may also be called untouchables in the sense that higher castes would avoid their contacts. We therefore refer to "untouchables" to designate both groups, although this is a simplification, that arguably is not excessive, of an incredibly complex picture.

As stressed by Srinivas (1974), the degree of pollution does vary depending on the kind of contact. For instance, entering a higher caste courtyard may be considered as an offense while touching an higher caste glass or water results in one of the most extreme degrees of pollution. Food and water are the paramount conveyors of ritual pollution. The geographical setting of traditional villages in India maps the social structure and the ban on caste mingling. The heart of the village is the higher caste district, while untouchables usually live in peripheral hamlets and rarely go through higher castes neighborhoods Beteille (1965). As a consequence, publicly provided goods such as water sources are segregated, each hamlet and thus caste groups having their own sources. Given the ritual pollution attached to untouchables and the ban on physical contact with them, they are forbidden access to other castes water sources. It is common knowledge in India that attempts from untouchables to draw water from higher caste wells sparks rural violence. Nevertheless, this prohibition may take different shape depending on the water source.

2.2 Individualized versus Common Sources

Physical contact of an untouchable with water taints the source. Even the contact of a vessel belonging to an untouchable does alter the ritual purity of the water Dumont (1970). Therefore, untouchables are not allowed access to sources where their jars have to be immersed. Out of the four distribution types identified in our data (2001 Census of India), that are wells, tanks, tubewells and taps, this prohibition would pertain to the first two. These two sources are therefore referred to as common. Of course, we are not able to rule out the possibility for tanks to have taps, in which case, little pollution would result from an untouchable using it. Nevertheless, we envisage most tanks as open and water collected with vessels. In villages where tubewells have been drilled, experience show that untouchables are not banned from using them, given that such a use would not imply any direct physical contact of either the individual or his vessel with water, but provided that untouchables stand last in lines. Therefore, this sort of water access is considered in our study as individualized, although it is of common use. Tap distribution is obviously considered as an individualized source. It may either be of common usage, in which case the situation resembles that of tubewell or private, in which case it is the utmost individualized water source.

[2]At least this is what is argued in chapter XXIII of Carrin (2006)

So far, the word individualized, in opposition to common has been used. We must reckon that the choice of the words is not very fortunate. We tried to give a description of what is meant by individualized and common in the precedent paragraph. We could have said that common sources are sensitive to untouchables pollution, while individualized are less sensitive. Nevertheless, for the sake of clarity and conciseness, we carry on with the words common versus individualized, in the hope that what is meant by these words is from now on more clear.

3 Related Literature

This article is an extension of the literature about the effect of social fragmentation on the provision of public goods and on conflicts. Previous works have found that high levels of social fragmentation do impair public goods provision Alesina et al. (1999); Banerjee and Somanathan (2001); Banerjee et al. (2005); Dayton-Johnson (2000); Khwaja (2009); Miguel and Gugerty (2005); Bardhan (2000) or induce conflict Collier (2001); Montalvo and Reynal-Querol (2002, 2005). These studies implicitly rest upon the idea that individuals feel a sense of community with members of their groups and perceive antagonisms with outsiders. These two features are more clearly laid out in the design of the polarization measure by Esteban and Ray (1994). The now popular polarization index includes a sense of group identification that depends on the population frequency within the group and group alienation that can be considered as a measure of intergroup antagonisms. Many experiments in social psychology such as, among others, the ones conducted by Tajfel et al. (1971); Chen and Li (2009) confirm these assumptions : individuals exhibit strong in-group preferences and reluctance towards members of other groups, even when groups are formed arbitrarily. These outcomes are strongly related to the process of social identification. Individuals easily class themselves and others into groups and identify with them.

Such an identification process may induce a wide array of economic outcomes as Akerlof and Kranton (2010, 2005, 2000) have shown, ranging from heterogeneity of preferences Chen and Li (2009), differences in prices Ball et al. (2001), or conforming to detrimental stereotypes Hoff and Pandey (2006). One of the most obvious implication of social identity is the setting of social norms. However, the social norms researchers often refer to govern within groups behaviors. Little stress has been put on norms ruling interactions between groups. Still they may be salient and of great consequence, if one thinks about segregation for instance.

Given that public goods give rise to groups interactions, it would seem fair to assume that norms governing the use of public goods need to exist. Therefore social fragmentation does not only possibly impair the provision of public goods, it may also mold the use that is made of these goods. The hypothesis on which our analysis is built is that if norms govern the use of public goods, violations have to be punished. This claim may help at understanding why the sharing of water sources is a ground for conflict in India. Indeed the caste system provides many examples of the arguments above. Undoubtedly caste shapes social identity. The ideology, tradition and texts that support the institution make a large way for rules that should be observed within the caste but also in interactions with other castes. They clearly

define with whom one is to share his meal, water, street or to marry. Many of these bans include the sharing of common resources. For instance, each neighborhood is to be homogenous in terms of caste and has to have its own water facility. This echoes the result obtained by Banerjee et al. (2005) that caste fragmentation has a positive effect on the provision of water facilities. The rule governing some inter-caste relationships is the absolute avoidance of contact and is referred to as untouchability. Our results show that these norms, as far as water sources are concerned, are still vigorous and that they may be violently enforced. Indeed, it will be shown that shared water sources do significantly increase the number of crimes against untouchables. Thereby, the results suggest that social fragmentation may also impact the use of public goods and that the latter may sharpen social divide.

4 Presentation of The Data

4.1 Acts of Violence

The database used has, to the best of our knowledge, not been analyzed before. Data on crimes, both against SCs and STs as well as any crime that falls under the Indian Penal Code ("IPC"), were collected from the National Crime Records Bureau ("NCRB") of the Indian Ministry of Home Affairs at the district level for the year 2001. Data cover 31 states and union territories and spread across 581 districts[3]. The total number of crimes[4] include murders, rape, kidnapping and abduction, dacoity[5], robbery, arson, hurt as well as complaints under the 1955 Protection of Civil Rights Act and under the 1989 Prevention of Atrocities Act[6]. Acts of violence were collected irrespective of the perpetrators. The national average number of crimes against untouchables is 16 per 100,000 individuals but exhibits strong variations across states as shown in the figure 3.1 below :

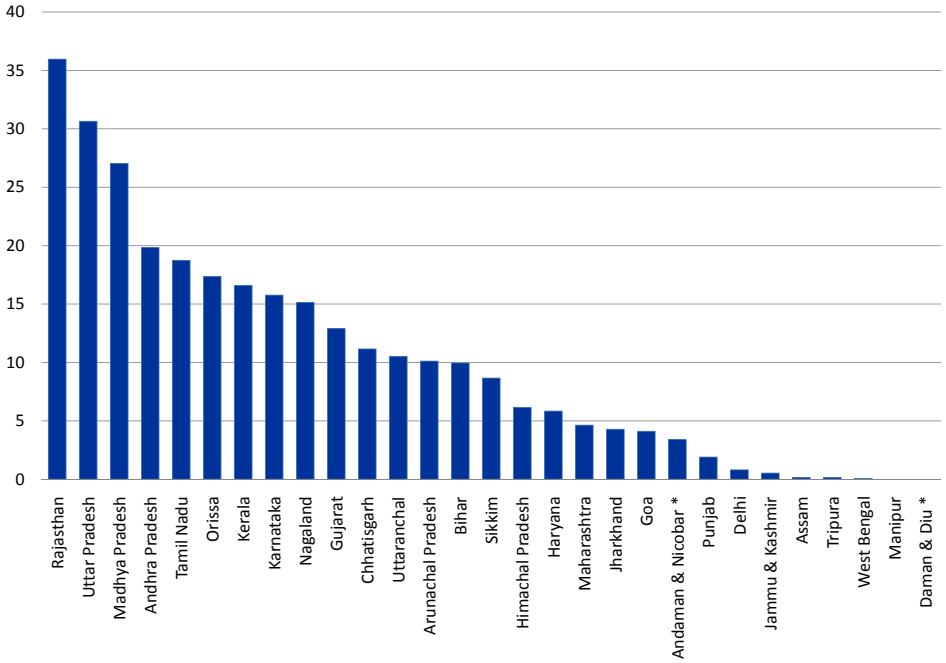
[3]Missing data are those of the following union territories : Lakshwadeep, Chandigarh, Dadra and Nagar Haveli, and Puducherry

[4]Cases registered by districts' crimes bureaux. This number os not the number of convicted cases. It is the number of complaints filed.

[5]Dacoity is defined by the Oxford English Dictionary as "an act of violent robbery committed by an armed gang in India and Burma".

[6]The Protection of Civil Rights Act and the Prevention of Atrocities Act specifically target discriminatory and humiliating practices, assaults, forced labor and crimes in relationship with untouchability. However, it seems that very few resort to this legislation as it has not been very operative for several reasons ranging from low conviction rates, court partiality and the use of SCs or STs as instruments by crime perpetrators. To be on the safe side, the total number of alleged crimes against SCs and STs was retained as more representative

FIG. 3.1 – State-wise number of crimes against SCs and STs per 100,000 SCs and STs individuals in 2001

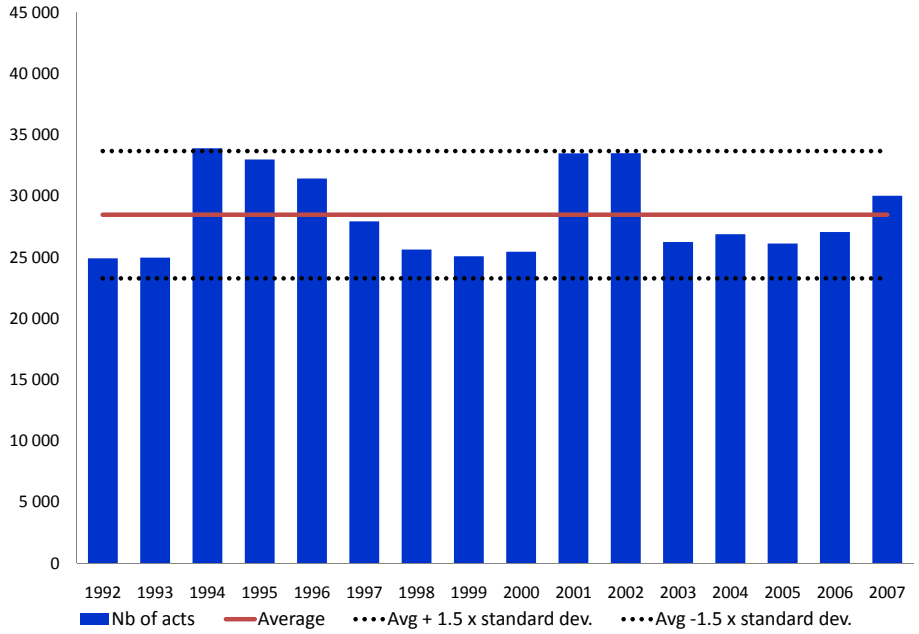


source NCRB, Ministry of Home Affairs, Government of India

Variations are even larger at the district level ranging from 0 to 199 in the Angul district of Orissa. Although 2001 and 2002 saw an increase in the number of acts of violence committed against untouchables and Scheduled Tribes, such an increase is not out of proportions as shown by the following figure 3.2. Indeed, number of crimes lies 1.5 standard deviations away from the mean over the 1992-2007 period. Data at the district level were only available for the year 2001 and lack of details for other years prevented us from using panel data.

Arguably, the variations in the number of acts of violence against SCs may come from regions or state specificities such as proneness to violence irrespective of the crimes' targets. Therefore, we need to control for the total number of crimes. Given that this variable partly includes the number of crimes against SCs and STs, it can not be placed as an explanatory variable. An alternative would be to purge the total number of crimes of those committed against SCs and STs. This procedure would be very approximate given that the crime heads accounted for in the total number of crimes may differ from those included in the number of crimes against SCs and STs as exhibited by the table 4.32 on page 175 in appendix. Moreover, we suspect that while a differentiation was made for instance between murder and attempt to commit murder for the total number of crimes, such a difference may not have been made for the number of murders of SCs and STs, both crime heads being incorporated under the label "murder". Moreover, the large other categories and the presence of untouchables specific legislation imply that such a purge may be very approximative and leads to large inconsistencies. Thus, the only sound way to neutralize the potential inertia in violence is to use as a dependent variable the percentage of acts of violence that specifically target SCs and STs over the total number of crimes as

FIG. 3.2 – Number of acts of violence against SCs 1992-2007 All India



source NCRB, Ministry of Home Affairs, Government of India

defined by the Indian Penal Code. It is denoted hereafter *crime*[7]

The *crime* variable exhibits large variations at the district level ranging from 0 to 0.51. 99 out of the 581 observations are at zero. For positive values, the variable exhibits an average of 0.035 and a standard deviation of 0.05. Total population as well as the percentage of SCs and STs will be introduced as control variables.

Data on crimes against untouchables may underestimate the actual number of acts of violence for three reasons : first, they only account for untouchables that file a complaint which is likely to be only a fraction of the victims. Second, police forces are often thought as being on the side of higher castes. Third, as the survey conducted by Shah et al. (2006) has shown, untouchables are sometimes denied entry to police offices. Therefore, our results may underestimate the actual phenomenon.

4.2 Access to Water and Other Public Goods

4.2.1 Main Variables

Data on the availability of different public goods come from the 2001 Census of India. The Census gives details at the village and town levels about the presence of taps, tubewells, tanks and wells. Based on this information we have calculated the percentage of the district population that has access to water through taps,

[7]Nevertheless, in order to gain some confidence that the transformation is not driving the relationship, we provide an estimation where the dependent variable is the total number of crimes against SCs and STs and where the total number of crimes reduced by the latter is introduced as a control variable. Table 4.28 on page 171 in appendix exhibit the results. Please bear in mind that these are very crude estimates for the reasons mentioned above.

tubewells, wells and tanks for 573 districts. Whenever one source was present in a village, the village population was accounted for as having access to water through such a source. In some instances, two or more sources were mentioned. In this case, village population was ascribed to each source. For instance, if a village of, say 5,000 inhabitants, had water distributed through tap and well and tank, the number of people for that village that have access to tap is 5,000, and the same number is reported for tanks and wells. The numbers are then aggregated at the district level and then divided by the total district's population. Therefore the percentages of inhabitant that access water through tap, tank, well or tubewell do not sum up to 1. The reason for such a method is to avoid ranking the types of water distribution modes. Indeed, had we taken the best of the three modes, we would have made a judgement call that may not be relevant and increased the correlations among the water distribution modes.

A note of caution is necessary. The Census does not provide information on whether these sources are private or public. For instance, tanks may be of common usage or privately maintained. Given that the Census mainly focuses on public goods, sources have been supposed to be of common usage. Such an assumption might introduce a downward bias in our results since the influence of truly public sources might be spread across both private and public sources.

4.2.2 Correlation between water distribution and crimes

The figure 3.5 and 3.6 below show the correlation between the *crime* variable and the percentage of common and individualized sources respectively[8].

[8]The common sources are tanks and wells. Please note that given that the two are not mutually exclusive, this variable varies between 0 and 2, 2 meaning that within a district 100% of the villages had both a well and a tank. The same goes for the individualized sources

FIG. 3.3 – Correlation between *crime* and common water sources

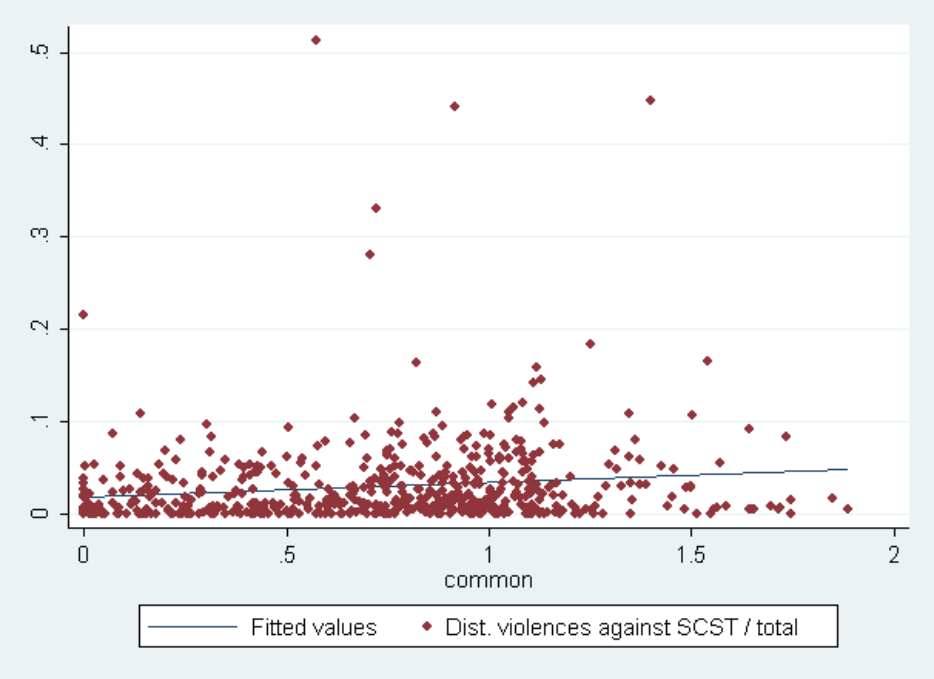
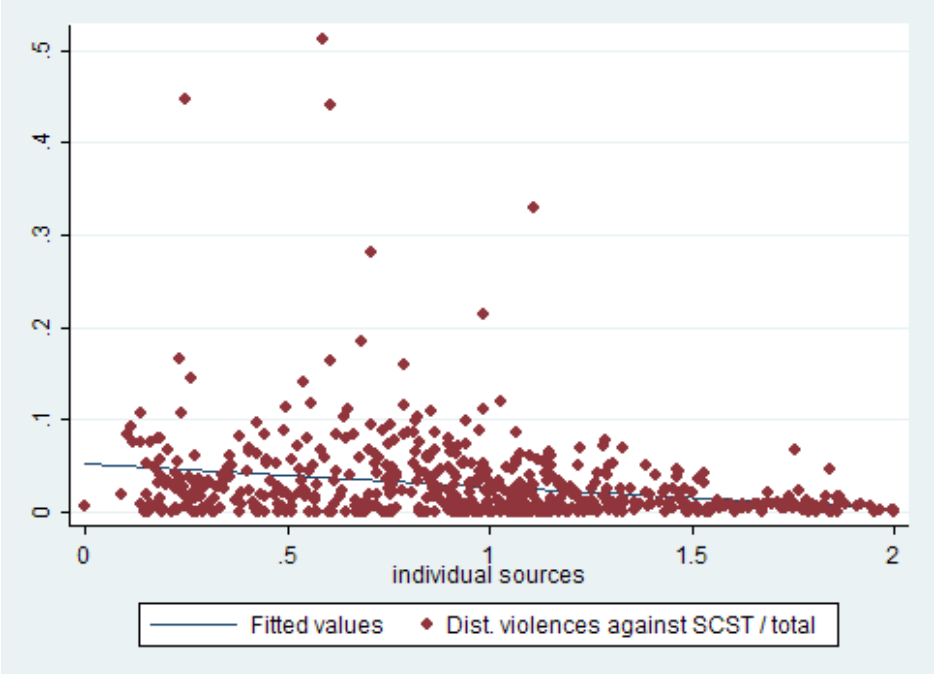


FIG. 3.4 – Correlation between *crime* and indivudalized water sources



These two graphs show that some observations for the variable *crime* might be outliers responsible for the relationship. Therefore, the 4 observations lying more than four standard deviations away from the mean are removed from the sample. The correlation in the reduced sample are presented below :

FIG. 3.5 – Correlation between *crime* and common water sources : restricted sample

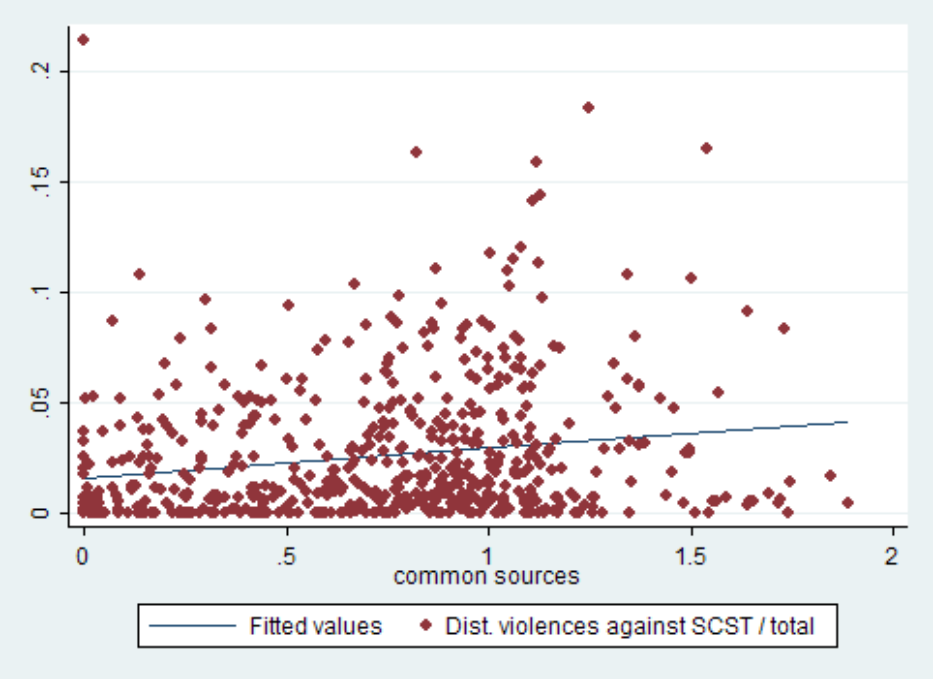
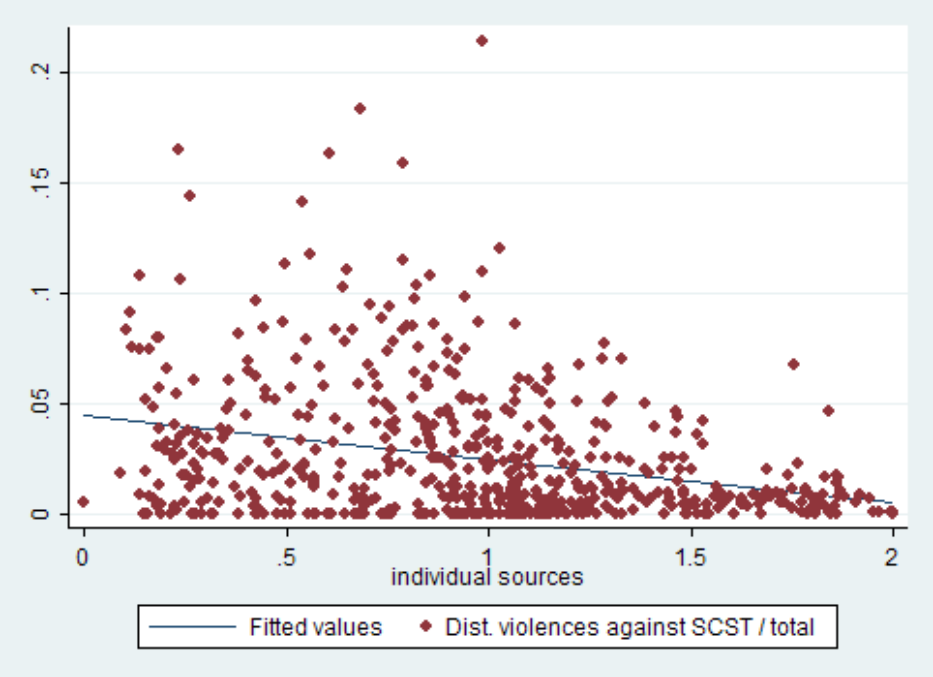


FIG. 3.6 – Correlation between *crime* and indivudalized water sources : restricted sample



Please note that the model in the chapter has been estimated over the whole sample. Nevertheless, results from the estimation over the reduced sample are presented in appendix (table 4.31 on page 174) and show that these points are not responsible for the relationship. Furthermore, we also present in appendix estimates

from a sub-sample where the 15 observations lying more than two standard deviations are removed from the sample. We shall come back to this point later when results are commented in section 6.

4.2.3 Heterogeneity in water access

Despite governments endeavors to improve water access, especially since it has been set as a core target of poverty alleviation programs, heterogeneity remains. Large disparities exist across states as well as between urban and rural regions. For instance, in 2001, only 23% of the households had access to water through either taps or tubewell in Kerala, while this number was 98% in Punjab.

On average 56% of a population's district access water through tap (standard deviation 0.31), 20% through tanks (standard deviation 0.19), 40% through tubewell (standard deviation 0.29) and 52% through wells (standard deviations 0.31). Although large disparities are found between districts, heterogeneity within states is relatively low as shown by the figures 3.7 displayed on the next page. Standard deviations associated with the four water variables are rather low at the state level especially compared to the overall sample.

As already mentioned, for our results to hold, we need to rule out states' specificities such as cultural violence or tensed caste relationships. In order to do so, we will resort to state fixed effects. The trouble is that the lack of heterogeneity of the water sources variables may weaken the water source effect. If the water source variables were introduced as such in a fixed effect regression, we request a small variations in the percentage of people who have access to the various sources to have an effect on a comparatively large variation in the dependent variable, i.e. the number of crimes. Besides, the potential multi-collinearity arising from the four water source variables may also be an issue. Table 4.27 in appendix presents the correlations across the four variables.

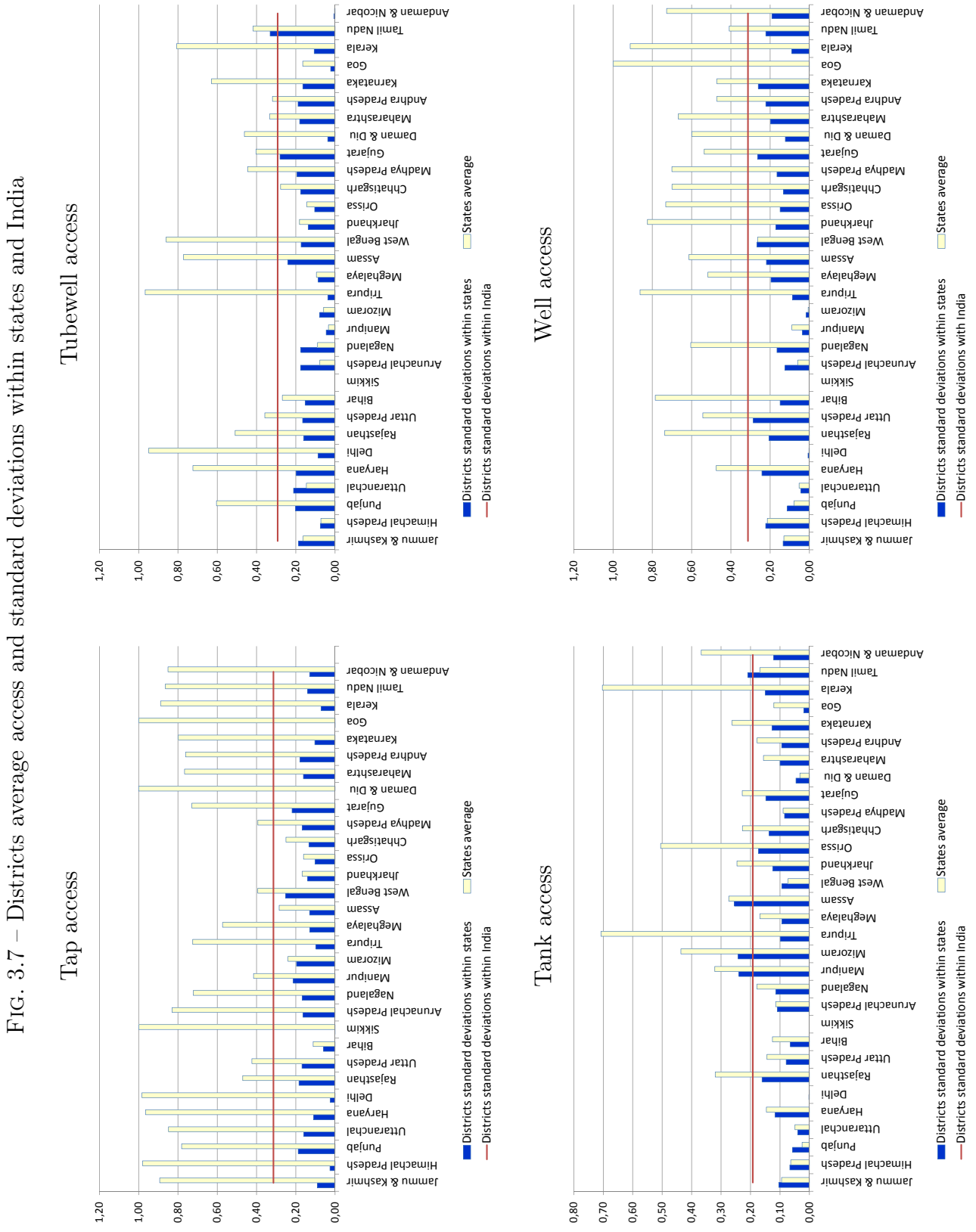
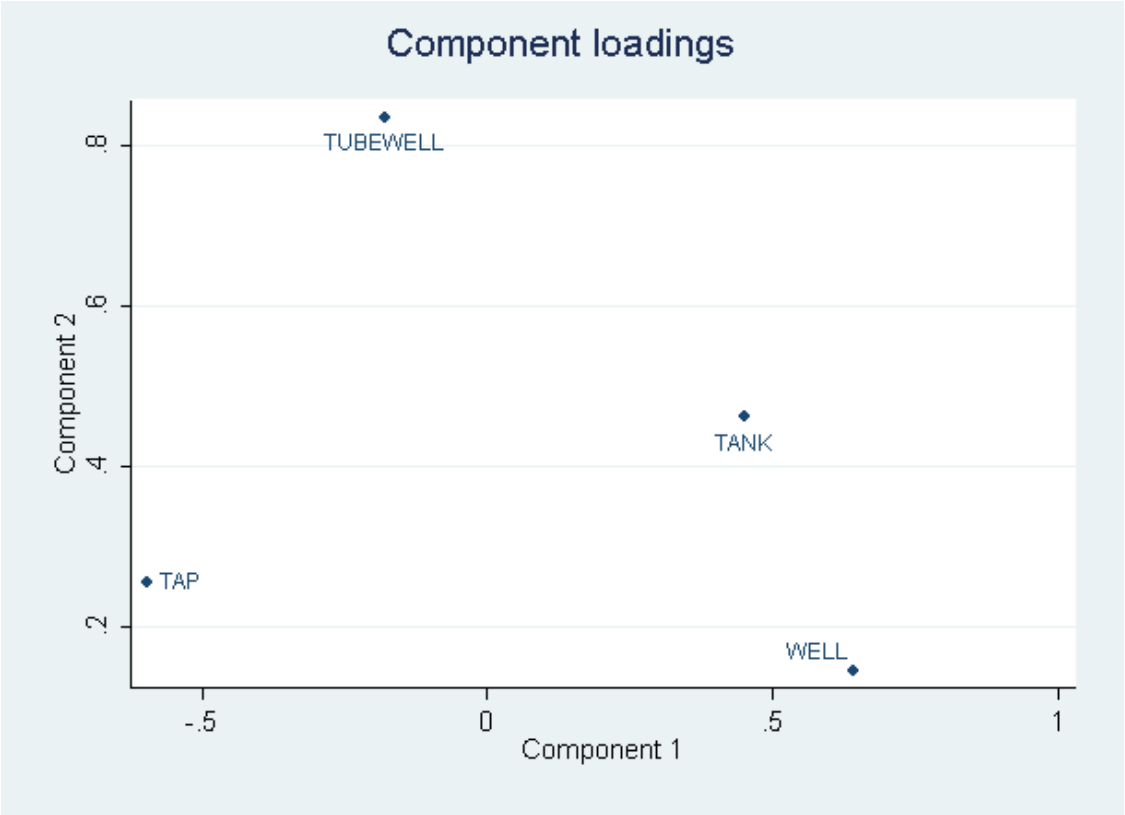


FIG. 3.7 – Districts average access and standard deviations within states and India

4.2.4 Principal Component Analysis

To tackle both the issues of low within states heterogeneity in the water source variables and of potential multi-collinearity, a principal component analysis ("PCA") of the water sources variables is performed. Moreover, reducing the four variables to a single indicator measuring the degree of individualization of the source will prove useful. Because PCA maximizes the variance of the original variable space, such a procedure is expected to reintroduce heterogeneity within the variables. The first component derived from the PCA has an Eigenvalue of 1.66 and accounts for 41% of the variance. The Kaiser-Meyer-Olkin measure of sampling adequacy takes on values between 0 and 1 and assesses whether the overall variables have too little in common to warrant a PCA. Cutoff point is 0.49. Lower values would indicate that PCA is not appropriate. This test, in our example is 0.54 which, although low, passes. We chose to retain the first component although the second component Eigenvalue is 1.06 and it explains 26% of the variance (the rule of thumb being to retain Eigenvalues whose values are greater than 1). The decision to retain only the first component rests on the scoring coefficients, whose ordering makes more sense in our example. Figure below 3.8 presents the scoring coefficients for the two components :

FIG. 3.8 – Scoring coefficients for the two components



The ordering of the variables according to the first component is in adequacy with the concept of common versus individualized sources. The scoring coefficient decreases with the individualization of the source. They are presented in table 3.1 below.

TAB. 3.1 – Scoring coefficients

	Component 1	Component 2
Tap	-0.5945	0.2564
Tubewell	-0.1789	0.836
Tank	0.4496	0.4624
Well	0.6422	0.1465

Given the scoring coefficients, the first component may be thought of as an inverse index of source individualization. The ordering of the sources according to the second component makes the interpretation more difficult. As a consequence only the first component will be retained. The variables, tap, tubewell, tank and well are then standardized and scoring coefficients are applied according to create the variable *water* according to the following formula :

$$\begin{aligned} water = \quad & -0.5945 \times tap\ standardized \\ & -0.1789 \times tubewell\ standardized \\ & +0.4496 \times tank\ standardized \\ & +0.6422 \times well\ standardized \end{aligned}$$

As mentioned, given that the weight attributed to the variables, the *water* variable may be thought of as an index of the collectiveness of the variable. The minimum attained by the *water* variable is -2.74 and occurs when 100% of the population access water through tap and tubewell. Maximum is 3.4 and occurs when 96% of the population access water through wells, 77% through tanks and 5% through taps and tubewells. The variables approximates 0 when access is equally spread between taps, tubewells and tanks, wells.

4.2.5 Other Public Goods

In order to clearly mark the specific role of water access on crimes against untouchables, other measures of access to public goods will be included as control variables such as the percentage of the district population that live in villages that are electrified or connected by paved roads as well as the number of schools per district inhabitant. On average, 88% of the district population live in electrified areas (standard deviation 0.18), 75% in villages or towns connected by road (standard deviation 0.20). On average a district has 9 primary and 3 middle schools per 100 inhabitants (standard deviation are 0.06 and 0.02 respectively).

4.3 Polarization

In order to control for potential antagonisms between castes, a polarization index has been calculated following Montalvo and Reynal-Querol (2002) as :

$$P = \sum_i \pi_i^{1+\alpha} \pi_j$$

where π_i is the population's share of the i^{th} group or caste among N. α is a parameter that may be considered as polarization's sensitivity. It measures the sensitivity to a shift from a low polarized society to highly polarized one. For $\alpha = 0$, the polarization index comes down to the standard fractionalization index that measures the probability that two randomly chosen individuals belong to the same group. The fractionalization index increases with the number of groups and is maximized at the uniform population distribution over these groups. Yet, this situation is not the one where the greatest level of antagonisms will be found. A situation where two large groups face each other is rather more conducive to potential conflicts. Polarization indices account for a such a situation and departs from the standard fractionalization index by increasing the weights on population frequencies through the parameter α. α is to lie in the [0 ;1.6] interval to ensure polarization is maximized when population is concentrated on two equally sized groups. The larger α, the larger the increase in the polarization measure when shifting from a low polarized society to a highly polarized one.

Caste polarization index has been calculated with i={SCs, STs, Others}. We must admit this is quite a rough measure as Indian society is much more fragmented along the lines of caste than merely split into three groups. Besides, intergroup social distance between SCs and STs may be smaller than between SCs and the rest of the population. However, this indicator has the virtue of accounting for the relative size of each group and to capture a potential non linear relationship between crimes against SCs and STs and their relative weights within the population. Summary statistics for the polarization measures are given in the table below :

Tab. 3.2 – Polarization summary statistics

	Mean	Standard Deviation	Minimum	Maximum
Polarization $\alpha = 0$	0.356	0.13	0.018	0.632
Polarization $\alpha = 1.6$	0.118	0.028	0.009	0.163

A similar index of religious polarization is included to account for the fact that caste based antagonisms may vary depending on the relative size of the different faiths, although castes transcend religions. The index of religious polarization has been calculated for $\alpha = 0$ and $\alpha = 1.6$.

5 Estimation Strategy

5.1 Base Specification

Given that observations are left censored at 0 and that 17% of the observations are at 0, a Tobit model has been used with left censoring at 0.

Let y_i^* be the latent variable associated with $crime_i$, where $crime_i$ is the number of crimes targeting SCs and STs over the total number of crimes in district i, so that

$$crime_i = \begin{cases} 0 & if \quad y_i^* \leq 0 \\ y_i^* & if \quad y_i^* > 0 \end{cases}$$

y_i^* is assumed to have a normal, homoscedastic distribution with zero conditional mean. Let's note X_{ik} the vector of explanatory variables, i standing for the district and k serves at identifying the explanatory variable. The intercept has been absorbed into X_{ik} for notational simplicity. The following equation may be written

$$\begin{aligned} y_i^* &= \beta_k X_{ik} + \varepsilon_i \\ \varepsilon_i / X_{ik} &\sim N(0, \sigma^2) \end{aligned} \tag{3.1}$$

Since ε/σ is assumed to be normally distributed and independent from X_k it could be written :

$$P(crime_i = 0 | X_{ik}) = 1 - \Phi(\frac{X_{ik}\beta_k}{\sigma}) \tag{3.2}$$

where Φ is the standard normal density function.
Let's note

$$d_i = \begin{cases} 0 & if \quad crime_i = 0 \\ 1 & if \quad crime_i > 0 \end{cases}$$

Hence the likelihood function for each observation i out of a total of N :

$$L = \prod_{i=1}^{N} [\frac{1}{\sigma}\phi\frac{(crime_i - X_{ik}\beta_k)}{\sigma}]^{d_i} [1 - \Phi(\frac{X_{ik}\beta_k}{\sigma})]^{(1-d_i)} \tag{3.3}$$

where ϕ is the standard normal cumulative function. The log-likelihood function for each observation i

$$ln(L) = \ell_i(\beta, \sigma) = \sum_{i=1}^{N} \{d_i(-ln\sigma + ln\phi(\frac{crime_i - X_{ik}\beta_k}{\sigma})) + (1-d_i)ln(1 - \Phi(\frac{X_{ik}\beta_k}{\sigma}))\}$$

The vector of explanatory variables X_{ik} encompasses, in addition to the intercept the following variables for district i :

$Water_i$ is the component obtained from the PCA as described in section 4.2.4

$ln(population)_i$ is the log of the district's population

$rural_i$ is the percentage of the districts' population that is rural

$literacy_i$ is the literacy rate

$castecomposition_i$ is a measure of the social composition by caste. In a first step, this measure will be the percentage of SCs and STs in the population together with their quadratic form. In a second step, it will be represented by polarization indices for $\alpha = 0$ (i.e. fractionalization) and $\alpha = 1.6$ (i.e. the highest possible level of polarization)

$religiouscomposition_i$ is the religious polarization index for $\alpha = 0$ and $\alpha = 1.6$

Equation 3.1 may then be written in full as

$$\begin{aligned} y_i^* =& \beta_0 + \beta_1 water_i + \beta_2 ln(population)_i + \beta_3 rural_i + \beta_4 literacy_i \\ &+ \beta_5 castecomposition_i + \beta_6 religiouscomposition_i + \varepsilon_i \\ &\varepsilon_i \sim N(0, \sigma^2) \end{aligned} \tag{3.4}$$

Naturally, *water* is the variable of interest and the lower the index, the more districts inhabitants access water from an individualized source. The higher the index, the more common is the access to water. β_1 is therefore anticipated positive given our main assumption : the more common the water source the higher the number of acts of violence against untouchables.

Other control variables mainly come from the 2001 Census of India. As far as the role of caste composition is concerned, we expect an inverse U shape relationship between the percentage of untouchables and the *crime* variable in the spirit of polarization. Indeed, literature on polarization Montalvo and Reynal-Querol (2002), Esteban and Ray (1994) show that highest probability of conflicts occurs when two equally sized group face each other. With respect to the caste polarization index measure, a positive relationship is expected for a high α while fractionalization is anticipated to be hardly relevant. Indeed, as already discussed, fractionalization is maximized by an equal distribution of the population on a large number of groups, a situation which may not necessarily lead to violence [9]. The role of religious composition is far from obvious. Although caste mainly stems from Hinduism, the institution does transcend religions and are found among Muslims, Christians and, although in a much attenuated way, even in religions that originally rejected the system such as Sikhism or Jainism. Therefore the expected sign is not clear. Nevertheless, inter faith violence is unfortunately not a rare phenomenon in India and may be exacerbated in a polarized context. Religious violence may replace caste based violence in highly religiously polarized environments. This hypothesis would lead us to anticipate a negative effect of religious polarization on caste based violence.

5.2 Potential Endogeneity Issues

5.2.1 Omitted Variables

It is a well known fact that some states in India, such as Rajasthan, Bihar or Uttar Pradesh for instance, are more prone to caste based violence than others. A variety of reason may be invoked such as economic backwardness, local traditions or political representations. For instance, in areas of the state of Bihar, the *Ranvir Sena* private militia largely run by upper castes landlords is known for its exactions against untouchables. The role of traditions is particularly strong in Rajasthan. All these reasons are potentially correlated with public goods provision such as water distribution. This raises the issue of omitted variables. As far as economic backwardness is concerned, the states 2001 GDPs are introduced as control variables. We had to resort to state indicators, since district level GDPs are notoriously unreliable or nowhere to be found. We also introduce an human development index

[9] For an excellent review of why fractionalization is irrelevant to the analysis of conflict, please refer to Montalvo and Reynal-Querol (2005)

as of 1991, which more broadly accounts for economic development at the state's level. Unfortunately, we were not able to control for political representation at the states parliaments. To be on the safe side, state fixed effects are introduced, which, arguably, would capture all the states specificities.

5.2.2 Reverse Causality

The provision of safe water has been given priority in the Constitution of India, with article 47 conferring the duty of providing clean drinking water. What the Census refers to as safe drinking water is water distributed through either taps or tubewells/handpumps. Many programs have been designed and implemented to improve water access. We would be faced with reverse causality if these programs were to take into account the untouchables situation in one way or another. Either programs specifically target regions where untouchables are particularly at a disadvantage or they neglect zones where most caste based conflicts are found. Given that water improvement programs are often part of poverty alleviation programs, the first scenario is the most likely. The 2001 National Human Development Report published by the Indian Planning Commission specifically addresses the SCs and STs access to safe drinking water and compare them to the rest of the population, thereby showing government's concerns for these groups. If water improvement programs are to take into account SCs and STs situations, this would be in the sense of favoring them rather than avoiding regions where they are the most at a disadvantage. Thus, if a reverse causality exists it is most likely to be unfavorable to our results and induce a downward bias.

It could be argued that the Indian government policies and programs have put an increasing emphasis on community participation and that such an emphasis may prompt reverse causality. Steps were initiated in 1999 to institutionalize community participation in the implementation of rural drinking water supply schemes[10]. Institutional mechanisms have been put in place at the national, state, district, block and panchayat levels to monitor water access improvement programs. It could be thought that highly violent environments are less likely to show the local cooperation necessary to implement such programs. In this case, the reverse causality would favor our results and introduce an upward bias. We have two main reasons to believe that this is not the case. First, the communities empowerment programs only started a year before data were collected. This probably isn't sufficient to change the patterns of water distribution modes to an extent that would greatly affect our results. Second, communities are not the sole actors. Authorities at the district and state levels also have a word to say and as mentioned earlier, it is unlikely that this word will be in disfavor of violent areas.

[10]Source : Water aid (NGO) report published by the National Urban Water Awards sponsored by the Government of India

6 Results

6.1 Base Specification

We wish to examine whether water access does impact the number of crimes against untouchables. Table 3.3 presents the results. As expected the index of water commonality is positive and significant. Shared water sources are significantly associated with a larger proportion of violent acts against untouchables. This effect holds for the various specifications presented.

In specification (1) only the percentage of SCs and STs in the district population are entered together with an index of religious fractionalization. While the percentage of SCs significantly increases the likelihood of caste based violence, the percentage of STs is not significant. This may be due to a potential non linear relationship between the percentage of untouchables and the number of acts of violence as the literature about conflicts and polarization suggest. Indeed, when the quadratic term for the percentage of STs is introduced in specification (3), a U-shaped relationship is found. STs are in majority in North Eastern States such as Mizoram, Tripura, Manipur, Nagaland, Meghalaya and Arunachal Pradesh or in the Andaman and Nicobar Islands. Tribes represent 52% of the population in these states against 8% for all India. When these states are removed from the sample, both the simple and quadratic form of the percentage of STs lose their significance [11]. Indeed, in states were they are not so numerous, tribes tend to live in isolated villages and do not mingle much with the rest of the population. This would explain why, when tribal states are removed from the sample, the percentage of STs is found to be irrelevant.

On the other hand, there is an inverted U-shaped relationship between the percentage of SCs and the number of acts of violence against them. SCs are more spread across the country. They represent on average 15% of the district's population ranging from 0 to 50%, although they account for more than 40% in only 29 of the 581 districts sampled. This inverted U-shaped relationship confirms the results found in the literature that studies the impact of polarization on conflict. The highest probability of conflict occurs when two equally sized groups face each other. Thus a caste polarization index is introduced in lieu of the percentages of SCs and STs in specifications (4) and (5). Not surprisingly the polarization index for $\alpha = 0$ (i.e. the fractionalization index) is not found significant while it is and positive for $\alpha = 1.6$, which makes sense given that polarization indices are best suited than the fractionalization index to capture potential antagonisms. The religious polarization index was introduced for the two values of α (specification (1) versus (2) and next) and both the religious fractionalization and polarization indices are found significant. Given the previous discussion on the impact of polarization versus fractionalization, we chose to retain the religious polarization index for $\alpha = 1.6$ in subsequent estimations. The negative sign associated with the religious polarization index is difficult to interpret. One explanation could be brought forward, although it is a mere assumption. In religiously polarized contexts, religion based conflicts may

[11] Results from this estimation are presented in table 4.30 in appendix

TAB. 3.3 – Water Access Effect on the Percentage of Crimes

	Percentage of Crime				
	(1)	(2)	(3)	(4)	(5)
Water	0.00745***	0.00713***	0.00742***	0.00567***	0.00605***
	(0.000381)	(0.000699)	(0.000428)	(0.00588)	(0.00329)
ln(population)	-0.00195	-0.000712	-0.000920	0.00154	0.000761
	(0.530)	(0.819)	(0.770)	(0.534)	(0.762)
% dist. pop. rural	-0.0212	-0.0220	-0.0165	-0.0120	-0.0163
	(0.177)	(0.161)	(0.289)	(0.446)	(0.304)
literacy rate	-0.0584***	-0.0630***	-0.0610***	-0.0680***	-0.0624***
	(0.00674)	(0.00362)	(0.00458)	(0.00189)	(0.00440)
% dist. pop SC	0.141***	0.148***	0.445***		
	(3.27e-05)	(1.04e-05)	(1.96e-05)		
% dist. pop SC^2			-0.858***		
			(0.00173)		
% dist. pop ST	0.0212	0.0209	-0.0735**		
	(0.127)	(0.133)	(0.0209)		
% dist. pop ST^2			0.144***		
			(0.000110)		
Religious polarization $\alpha = 0$	-0.0523***				
	(0.000326)				
Religious polarization $\alpha = 1.6$		-0.224***	-0.194***	-0.258***	-0.252***
		(6.69e-05)	(0.000638)	(5.95e-06)	(8.50e-06)
Caste polarization $\alpha = 0$				0.00290	
				(0.873)	
Caste polarization $\alpha = 1.6$					0.175**
					(0.0374)
Observations	573	573	573	573	573

Robust p-values in parentheses
*** significant at 1%, ** significant at 5%, * significant at 10%

overtake caste based conflicts and thus would reduce the number of acts of violence against untouchables. Nevertheless, the positive impact of the water index is robust to the introduction of the polarization indices, meaning that even when the various potentially confrontational contexts are accounted for, water communality remains associated with caste based violence.

As mentioned in section 4.2.2, 15 observations lie more than two standard deviations away from the mean and 4 more than four standard deviations away. Table 4.31 on page 174 in appendix presents the results when the model is estimated over the restricted samples. Please note that the significance of the coefficients associated with the water component is not altered while their sizes are somewhat reduced. Thus, these observations may not be viewed as responsible for the relationship, although they inflate the sizes of the coefficients. This will be taken into account when the implications of the sizes of the coefficients will be discussed in the following section [12].

[12]Moreover, as it can be seen from table 4.28 on page 4.28 in appendix the transformation of

Please recall that the water commonality index, which is the variable of interest was obtained through PCA in order both to reintroduce heterogeneity in the data and to reduce potential multi-collinearity. Yet, in order to dispel doubts about the genuineness of the procedure, estimations with the four variables included in the PCA are presented in table 4.29 in appendix. Results show that access through tanks and wells significantly increase the number of acts of violence against untouchables, while access through tubewells significantly decrease this number. Tap access however is not significant. The table shows that increasing by 1 unit the percentage of people that can access water by tubewell may reduce by 3% the percentage of acts of violence targeting SCs and STs.

6.2 Magnitude of the effects

The highest value for the *water* variable is found in the Nayagarh district of Orissa (3.409084). In this district the most common form of water distribution is through common sources. Tap water is available to 5% of the district's population, water through tubewell to 5%, while wells and tanks are available to 96% and 77% of the population respectively. The proportion of crime targeting SCs and STs is 83 every 1,000 crimes.
Specification (5) of the model estimated in table 3.3 predicts that the probability for this district to have a strictly positive number of crimes related to SCs and STs is 80.5% given the value of the component and all other factors held constant. The expected proportion of crimes targeting SCs and STs in this district, assuming the crime rate to be strictly positive, given the value of the component and *ceteris paribus* is 61 per thousand crimes. Hence, the expected number of crimes against SCs and STs is 50 every thousand crimes in this district.

Suppose that in this district the percentage of the population accessing water through tap increases by one standard deviation. This would imply that 36.5% of the district's population has access to tap water instead of the previous 5% . This induces a change in the component from the maximum of 3.41 to 2.81, which in turn modifies the expected proportion of crimes targeting SCs and STs from 50 to 47 per thousand crime. Please bear in mind that the average proportion in the whole sample is 29‰. In broad terms, an increase of 30% in tap access induces a decrease of 10% in the proportion of crimes against SCs and STs.

Following the same procedure, the expected proportion of crimes against SCs and STs in the Chennai district of Tamil Nadu, where the *water* component takes its minimal value of -2.745[13] is 24‰. Thus the difference in expected proportions between the two extreme values taken by the component is 23‰when the actual difference is 82‰. Table 3.4 summarizes the analysis.

the dependent variable does not seem to be responsible for the relationship. Yet, given all that has been said about the difficulty in reconciling the two numbers for crimes, these results should be taken with circumspection.

[13]100% of the population has access to tap water and tubewell and there is no well or tank

The effect of the type of water distribution is rather modest. Yet, we need to keep in mind that the number of crimes committed against SCs and STs were collected irrespective of the offenders' castes. They may therefore include crimes committed against SCs by SCs, in which case, the estimated effect of the type of water distribution may be underestimated.

TAB. 3.4 – Effects of Changes in the Value of the Component on the percentage of crimes

Value of component		$Pr(crime_i > 0)$	$\times E(crime_i \mid crime_i > 0)$	$= E(y_i^* \mid crime_i > 0)$	Actual value for *crime*
Maximum	3.409	80.5%	61.4‰	49.5‰	83.3‰
1 sd incr. in tap	2.815	78.5%	59.3‰	46.6‰	
Minimum	-2.745	55.2%	43.3‰	23.9‰	1.0‰

6.3 Relevant Crimes

So far the relationship between the water distribution mode and the percentage of crimes targeting SCs and STs, was estimated irrespective of the crime heads. Yet, it is likely that some crimes are not related to untouchability practices, such as, for instance, robbery. In order to identify which type of crimes are likely to be related to untouchability, specification (5) of table 3.3 is estimated for each crime head.

The difficulty of purging the total number of crimes of those related to SCs and STs has already been mentioned. Yet, given that in this section we proceed by crime heads, such a reconciliation may be easier although one caveat is necessary. We may suspect that classification was not made on the same basis for SCs and STs and for the whole population. For instance, in the latter case three crime heads pertain to murder : attempt to commit murder, culpable homicide not amounting to murder, and plain murder. Yet, as far as SCs and STs are concerned, there is only the "murder" crime head. So either, attempt to murder an SC or an ST was classified under the murder head or in the other category. Moreover it is not unlikely that some crimes are registered as for instance hurt when it is not related to an SC or an ST and under the Prevention of Atrocities Act when it pertains to a member of the weaker segments of society. Thus in the absence of further details about the classification of crimes, the results presented below should be taken with caution.

Two types of estimations are presented. First, similar to what has been done for the total number of crimes, the dependent variable is a ratio of, for instance, the total number of rapes of SCs and STs over the total number of rapes committed as a whole. In a second step, the total number of, for instance, rapes of SCs and STs

is introduced as the explained variable, while the number of rapes of non scheduled individuals is introduced as a independent variable[14]. For untouchables specific legislation, such as the Prevention of Atrocities Act ("PAA") and the Protection of Civil Rights ("PCRA"), the control variable is the total number of crimes, based on the assumption that the latter does not include the formers. These two procedures should provide some comfort about the innocuousness of the transformation of the dependent variable.

Results from the two estimations are presented in tables 3.5 and 3.6 respectively. The type of water distribution is shown to significantly impact the following types of crimes against SCs and STs : rape, arson, hurt and all the crimes that fall under the Protection of Civil Rights Act. Oddly enough, the latter is negatively influenced by the "commonality" of the water source, although the significance level of the coefficient associated with the *Water* variable is close to the 10% threshold.

[14]The latter is calculated by subtracting from the total number of cases per crime head, the number that is related to untouchables victims.

TAB. 3.5 – Water Access Effect on the Percentage of Crimes by Crime Head

	Dependent variable is the ratio of crimes targeting SCs and STs / total number of crimes								
	Crime Head								
	(1) Murder	(2) Rape	(3) Kidnapping	(4) Dacoity	(5) Robbery	(6) Arson	(7) Hurt	(8) PCRA	(9) PAA
Water	-0.000422	0.0384***	0.00821	-0.116	0.0224	0.367**	0.0324***	-2.322*	1.353
	(0.95100)	(0.00044)	(0.56300)	(0.11100)	(0.26500)	(0.02090)	(0.00129)	(0.09130)	(0.61400)
ln district population	0.0168*	0.0392***	-0.00853	0.164*	0.0205	0.771***	0.0286**	10.39***	29.05***
	(0.05370)	(0.00448)	(0.60800)	(0.09580)	(0.42200)	(0.00049)	(0.02360)	(0.00005)	(0.00000)
% district pop rural	-0.0531	-0.108	-0.309***	0.523	-0.152	-2.006	-0.0774	-10.82	46.35*
	(0.31900)	(0.21000)	(0.00515)	(0.34000)	(0.34300)	(0.10400)	(0.33600)	(0.27000)	(0.06140)
literacy rate	-0.203***	-0.246**	-0.504***	0.835	-0.483**	-5.673***	-0.299***	-7.957	-87.97***
	(0.00550)	(0.02940)	(0.00200)	(0.28700)	(0.02920)	(0.00081)	(0.00428)	(0.57600)	(0.00200)
Religious polarization alpha=1.6	-0.497***	-0.124	-0.571	-1.68	-1.359**	-3.113	-0.624**	-104.1***	-174.5**
	(0.00756)	(0.67400)	(0.14300)	(0.39000)	(0.01470)	(0.46500)	(0.02170)	(0.00642)	(0.01790)
Caste polarization alpha=16	-0.0944	1.844***	1.544***	-0.702	-1.414*	12.96*	-0.271	-40.89	321.2***
	(0.73300)	(0.00011)	(0.00892)	(0.80500)	(0.06820)	(0.06850)	(0.50600)	(0.45200)	(0.00750)
Total number of crimes								0.000459	0.00601***
								(0.37700)	(0.00001)
Observations	573	573	573	573	573	573	573	573	573

Robust p-values in parentheses
*** significant at 1%, ** significant at 5%, * significant at 10%

TAB. 3.6 – Water Access Effect on the Number of Crimes against Untouchables by Crime Head

	Dependent variable is the number of crimes against SCs and STs						
	Crime Head						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Murder	Rape	Kidnapping	Dacoity	Robbery	Arson	Hurt
Water	0.0359	0.670**	-0.0917	-0.455	0.451	0.783**	3.657***
	(0.87600)	(0.01270)	(0.69400)	(0.23900)	(0.32500)	(0.01030)	(0.00398)
ln district population	1.191***	1.059***	0.552*	0.886	1.017	2.259***	7.857***
	(0.00131)	(0.00489)	(0.07080)	(0.10900)	(0.12100)	(0.00000)	(0.00002)
% district pop rural	-2.512	-0.804	-3.463*	1.458	-1.306	-4.523*	-13.36
	(0.16700)	(0.70500)	(0.07210)	(0.61500)	(0.74500)	(0.05300)	(0.18600)
literacy rate	-9.016***	-5.103*	-9.301***	2.211	-12.63**	-12.22***	-24.44*
	(0.00041)	(0.06370)	(0.00072)	(0.59700)	(0.01210)	(0.00022)	(0.06930)
Rel. Polar. $\alpha = 1.6$	-9.437	-17.29**	-7.577	-9.458	-32.01**	-8.949	-95.97***
	(0.13000)	(0.01700)	(0.23400)	(0.36500)	(0.01160)	(0.28300)	(0.00532)
Caste Polar. $\alpha = 1.6$	22.33**	57.61***	37.78***	2.744	-14.77	29.35**	102.1*
	(0.02220)	(0.00000)	(0.00019)	(0.85800)	(0.41300)	(0.03340)	(0.05450)
Murders of	0.0228***						
non scheduled	(0.00003)						
Rape of		0.150***					
non scheduled		0.00000					
Kidnapping of			0.0161***				
non scheduled			(0.00738)				
Dacoity non-scheduled				0.0224			
				(0.41400)			
Robbery					0.0228*		
non-scheduled					(0.05410)		
Arson						-0.026	
non-scheduled						(0.15500)	
Hurt							0.00946***
non scheduled							(0.00035)
Observations	573	573	573	573	573	573	573

Robust p-values in parentheses
*** significant at 1%, ** significant at 5%, * significant at 10%

6.4 State Specificities

As already mentioned other factors may influence the level of public goods supply such as economic or human development, politics or tradition. Since these factors may be correlated with caste based violence, we need to control for these possibilities. Table 3.7 below presents the results when the state GDP is entered (specification (1), (3) and (4)), when the Human Development Index (hereafter "HDI") is entered (specification (2), (3) and (4)) and state fixed effects (specification (5)). Again, the water communality index is positive and significant across all specifications. Both the log of the state's GDP and the HDI are significant, although this mainly stems from the state of Uttar Pradesh, whose GDP is the second largest of all states'[15] and that is the most populated state, but also one where caste relationships are tensed to put it mildly. When Uttar Pradesh ("UP") is removed from the sample (specification (4)), both GDP and HDI lose significance. The particularity of this state supports the necessity to account for state specificities. This is what specification (5) does by introducing states fixed effects in the equation. Interestingly, caste polarization loses its significance when states variables are introduced. This probably stems from the fact that the index does not sufficiently vary within states. Indeed within states average standard deviation of the index is 0.019 compared to an average of 0.12. Even when state specificities are taken into account, the more common the water source, the higher the number of acts of violence against untouchables.

6.5 Other Public Investments

There are three reasons to introduce public investments in other types of infrastructure in the equation. First, it will underline the unique position enjoyed by water supply. As exposed earlier, public investments in water supply plays a specific role in crimes against untouchables, due to the Indian sociocultural context. Second, although we have done our best to control for all the usual variables that influence public goods provision such as polarization, wealth or state specificities, introducing other types of public goods may help at controlling for potentially omitted factors. Third, other public investments such as education for instance may be thought of as having an incidence on crimes against untouchables. Table 3.8 below presents the results when other kind of public investments are introduced without and with state fixed effects (specifications (1) to (4) and (5) to (8) respectively).

The first and fifth specifications introduce the percentage of villages that are electrified in a district. This does not change the sign of coefficients associated with the variable of interest although it becomes significant only at the 10% level when state fixed effects are introduced. The coefficient for electricity is barely significant without fixed effects and loses its significance with fixed effects.

When the percentage of villages accessible by road is introduced, coefficients associated with the *water* variable remain significant, although only at the 10% threshold with fixed effects. The *road* variable is significant and negative once states fixed effects are introduced. Presumably, what this variable captures is the district's

[15] In 1999 Uttar Pradesh had the second largest GDP behind Maharashtra according to the Indian Ministry of Statistics

TAB. 3.7 – Water Access Effect - State Controls and Fixed Effects

	Percentage of Crime				
	(1)	(2)	(3)	(4)	(5)
Water	0.00626***	0.00809***	0.00805***	0.00874***	0.00590**
	(0.00228)	(0.000591)	(0.000613)	(0.000347)	(0.0486)
ln(population)	-0.00984**	-0.000988	-0.0116***	-0.00733*	-0.00328
	(0.0103)	(0.710)	(0.00498)	(0.0917)	(0.390)
% dist. pop. rural	-0.0198	-0.0274	-0.0293*	-0.0356**	-0.000232
	(0.211)	(0.104)	(0.0821)	(0.0408)	(0.990)
literacy rate	-0.0649***	-0.0369	-0.0401	-0.0241	-0.0237
	(0.00293)	(0.207)	(0.169)	(0.431)	(0.382)
Religious polarization $\alpha = 1.6$	-0.250***	-0.206***	-0.203***	-0.312***	-0.0892
	(9.05e-06)	(0.000924)	(0.00106)	(2.52e-06)	(0.166)
Caste polarization $\alpha = 1.6$	0.113	0.172*	0.0976	0.163*	0.124
	(0.187)	(0.0585)	(0.295)	(0.0929)	(0.204)
ln (state GDP)	0.0104***		0.0105***	0.00311	
	(0.000589)		(0.00151)	(0.377)	
Human Development Index		-0.0895**	-0.0864*	-0.000626	
		(0.0489)	(0.0567)	(0.990)	
Observations	571	527	525	455	573
Fixed Effects	No	No	No	No	Yes
Sample	All	All	All	UP removed	All

Robust p-values in parentheses
*** significant at 1%, ** significant at 5%, * significant at 10%

level of isolation and backwardness. Therefore, even controlling for this aspect of the district, results concerning *water* still hold. Please note that the diminished coefficient may stem from a significant correlation of -0.43 between the *water* index and the percentage of villages accessible by road.

As mentioned, education could be thought of as having a negative impact on caste based violence. Presumptive evidence is found with the negative and significant coefficient associated with the population's literacy rate in previous tables. Indeed, the numbers of primary and middle schools per inhabitant have a negative significant effect on caste based violence, although the effect looses its significance for middle school once fixed effect are introduced. This may be due to the fact that middle schools are less local. They recruit within a larger radius, which dampens the variable's variance within states. Nevertheless, a reassuring result is that infrastructure in primary education are also effective at reducing violence against SCs and STs. Yet, the results associated with the index of water communality are robust to all these inclusions, thereby stressing the fact that water distribution plays a role of its own, even when other public investments are also effective at reducing the number of acts of violence against SCs and STs and when state specificities are accounted for.

We have seen that the number of crimes against untouchables is affected by the water distribution mode. This result is robust to various specifications including

TAB. 3.8 – Water Access Effect - Including other Infrastructures

	Percentage of Crime			
	(1)	(2)	(3)	(4)
Water	0.00738***	0.00685***	0.00482**	0.00598***
	(0.000776)	(0.00138)	(0.0275)	(0.00572)
% villages electrified	0.0299*			
	(0.0837)			
% villages connect. by road		0.0210	-0.00597	0.0115
		(0.169)	(0.723)	(0.463)
Nbr primary school / inhab.			-0.239***	
			(0.000442)	
Nbr middle school / inhab.				-0.356**
				(0.0214)
Observations	573	573	573	573
Fixed Effects	No	No	No	No
	Percentage of Crime			
	(5)	(6)	(7)	(8)
Water	0.00548*	0.00530*	0.00527*	0.00499*
	(0.0675)	(0.0765)	(0.0773)	(0.0955)
% villages electrified	-0.0360			
	(0.112)			
% villages connect. by road		-0.0458**	-0.0621***	-0.0502**
		(0.0304)	(0.00497)	(0.0185)
Nbr primary school / inhab.			-0.178**	
			(0.0153)	
Nbr middle school / inhab.				-0.342
				(0.108)
Observations	573	573	573	573
Fixed effects	Yes	Yes	Yes	Yes

Robust p-values in parentheses
*** significant at 1%, ** significant at 5%, * significant at 10%
All specifications include ln(population), % rural, literacy, caste and religious polarizations

state specificities and other public investments. Therefore, a nice unexpected side effect of the water improvement programs is the reduction in the number of possible bones of contention across castes. A note of caution is necessary. We do not claim that generalizing access to tap water will eradicate caste based violence. This would be presumptuous and absurd. What is claimed is that the government's efforts to provide safe drinking water (i.e. through taps or tubewells) with the intent of improving public health, have the nice side effect of weakening the role of excuse played by water for caste based violence. No doubt that caste confrontations will occur on other grounds. Yet given the salience of water in caste prohibitions, eliminating such a bone of contention is of great interest. This recommendation may appear shortsighted and pointless if caste is not to be fought at its base. We fully concur with this view, yet it would provide some temporary relief to oppressed caste besides improving public sanitation. What are results suggest is a side effect of public

investments rather than its essential purpose.

6.6 Violence Inertia

The question we now wish to address is : "does the effect of water supply vary according to different levels of violence ?". It may very well be the case that the same source of social tensions, water for instance, has a larger impact in an already violent environment. In order to provide some elements, a simultaneous quantile regression has been carried out. This methodology considers the error correlation between different quantiles thanks to the bootstrapped variance-covariance matrix. It enables comparison between coefficients in different quantiles (Koenker and Hallock (2001)). The percentage of crimes is split into four quantiles. Results are presented in table 3.9.

Tab. 3.9 – Quantile Regressions

	Percentage of crimes		
	(1)	(2)	(3)
	q25	q50	q75
Water	0.00110	0.00378***	0.00671***
	(0.146)	(0.000555)	(7.55e-05)
ln (population)	0.00135***	0.00117	-0.000428
	(0.00157)	(0.223)	(0.818)
% dist. pop rural	-0.00287	-0.00579	-0.00781
	(0.301)	(0.178)	(0.406)
literacy rate	-0.0153**	-0.0479***	-0.109***
	(0.0192)	(2.97e-05)	(3.45e-10)
Religious polarization $\alpha = 1.6$	-0.0733***	-0.0918***	-0.112**
	(3.09e-06)	(0.000809)	(0.0363)
Caste polarization $\alpha = 1.6$	0.0558***	0.110***	0.169**
	(0.00211)	(0.00257)	(0.0269)
Observations	573	573	573

Robust p-values in parentheses
*** significant at 1%, ** significant at 5%, * significant at 10%

These results clearly evidence that water is only an excuse for caste based confrontations. Indeed, where violence is low, the water distribution mode has no impact. Yet, in already violent environments, the impact of water increases together with the level of violence. Conclusions that may be drawn from this analysis are twofold. First, water really is an excuse for already existing caste based violence and as mentioned earlier, investments in public infrastructure would not eradicate the problem, but rather provide some temporary relief. Second, if a choice has to be made about which zones should be given priority in terms of water access improvements, such a decision would benefit from taking caste based violence as one of the criteria.

7 Conclusions

It has been demonstrated in this chapter that violence targeting untouchables is significantly linked to the water distribution mode. These results induce many consequences. First, they show that untouchability practices are still common in India. In compliance with caste prescriptions, untouchables are denied access to common water sources and in accordance with stories of caste based violence recounted in newspapers, this prohibition is violently enforced. One could think that this study is India specific. Yet, this Indian example encourages us to question the role of social norms on public goods usage. So far, the literature has attempted to show the negative impact of social fragmentation on the provision of public goods, through diminished collective action. Yet, the collective action problem may arguably be solved by the creation of intergroup norms, such as the exclusion of a group in our case. In which case, there is not much ground to think that social fragmentation impacts public goods provision. Rather, publicly provided goods and their attached social norms may sharpen social antagonisms and divides.
Another point evoked by the study is the need for policy makers to look into the usage that is made of public goods. Most development programs focus on the level of public goods and do not attach the necessary importance to what use is made of the goods.We shall come back to this point in the next chapter.

Lastly, improving water access does reduce the number of crimes against untouchables. Although water improvement programs are mainly designed out of public health concerns, recognizing that it has a side effect on caste based violence add an argument for increased efforts in this domain. As already mentioned, it is not claimed that water improvement programs will uproot caste violence and there is little doubt that confrontations between caste will occur on other grounds. Excuses for caste based violence do not lack. Yet, given the salience of water in caste traditions, improving water access may provide temporary relief to oppressed castes on top of improving sanitation.

Chapter 4

Social Fragmentation and Public Goods : Polarization and Patronage in Uttar Pradesh and Bihar

1 Introduction

The previous chapter showed that caste composition has an impact on the use of public goods such as water through the introduction of usage norms and rules that may be violently enforced. As far as castes are concerned, such a norm is segregation of the public space and public goods appear closer to club goods. If castes do not share public goods, social fragmentation along the lines of castes would most probably have an impact on public goods provision. Many theoretical as well as empirical works brought to light a negative effect of social fragmentation on public goods provision through hampered collective action. Such a negative impact goes mainly through three channels. First, heterogenous societies often exhibit strong differences in preferences regarding public goods characteristics and therefore encounter difficulties in voicing their claims on limited public resources. Second, individuals may be reluctant to work with other groups' members. The impact of group heterogeneity on group participation has been analyzed by Alesina and Ferrara (2000). The third issue arises from the fact that different groups may disagree on the sharing of the private benefits or on the allocation of their effort, due to potential free riding. Moreover, they fail to implement cooperation enforcement devices across groups.

No matter the channel, this literature rests upon the idea that social fragmentation induces social tensions and such an assumption may be criticized with two arguments : first, social fragmentation is most of the time assessed though the now common fractionalization index that does not properly account for potential social antagonisms. Second, the relationship between social fragmentation and antagonisms is far from being established. By assuming that the former necessarily leads to the latter, authors have neglected the arising of social norms ruling intergroup relationships. Such rules may weaken potential antagonisms, even in very heterogenous societies. For instance, if the rule is that each group is to promote access to public goods for its members and refrain from using other groups resources, a norm that will be called "patronage" in this chapter, social fragmentation may have a positive effect on public provision of common goods. This point has been made by Alesina and Ferrara (2005). As they rightly point out "while pure public goods may be lower in more fragmented communities, the amount of publicly provided "private" goods - especially those that can be targeted to specific groups - may be larger. We can then have a positive correlation between fragmentation and ethnically based patronage". This precisely is the hypothesis that will be tested in this chapter. Many reasons lead us to believe that caste patronage with respect to public goods is taking place in India. Relationships between castes are based on avoidance, while caste is supposed to provide its members with some support, or at least cohesion. As mentioned in introduction to this dissertation, some sociologists such as Baechler (1988) believed that the need to solve collective action problem was the *raison d'être* of castes.

The aim of this chapter is to test the impact of caste fragmentation on public goods provision. It will be shown in a first step that if fractionalization is to play a role it is likely to be a positive one. Second, I will try to establish that this impact is not linked to potential antagonisms, as the impact of polarization indices is not found significant. Lastly, the occurrence of patronage activities will be looked into by showing that a households caste does influence public goods access, depending

on the dominant caste in the village. This study is based on data collected by the World Bank in the Living Standard and Measurement Survey conducted in 1997 and 1998 in the Northern Indian states of Uttar Pradesh and Bihar.

2 Related Literature

To date, theories have established that social heterogeneity hampers collective action through preferences heterogeneity (Alesina et al., 1999), reluctance to work with members of other groups (Alesina and Ferrara, 2000), or a disagreement on the sharing of the private benefits or on the allocation of efforts (Banerjee et al., 2005), due to potential free riding as well as a lack of cooperation enforcement design. Banerjee et al. (2008) provided a comprehensive summary of these theories and introduced the effect of specific contexts such as an unequal power distribution across groups, the presence of influential groups or the degree of group cohesion while concluding that groups characteristics only account for a small share of the variations in public goods provision. These authors underline the difficulty experienced by many authors, as we shall see later, in untangling the effect of social fragmentation and that of inequality. Social fragmentation is supposed to be detrimental to public goods provision while inequality favors collective action according to Bardhan et al. (2007) among others. This echoes the positive role on collective action attributed by Olson (1965) to inequality, through the presence of wealthy individuals.

Empirically, the impact of social fragmentation on public goods provision was first brought to light by Alesina et al. (1999). Working on US counties, metropolitan areas and cities data, the authors evidenced that the most socially fragmented zones spend less on schools, roads, trash pickup and more on health and police. Oddly enough, these last two goods may be thought of in the U.S. context as somewhat related to income, thereby suggesting that social fragmentation may favor the presence of public goods provided that income comes in the equation.

As Banerjee and Somanathan (2001) rightly pointed out, Alesina et al. (1999) used data for public goods that are contemporaneous to the fractionalization data, and given the high mobility environment of US cities, the analysis may be flawed with reverse causality due to a sorting effect analyzed by Tiebout (1956). According to Tiebout's model, individuals sort themselves to areas that provide them with the mostly desired public goods thereby homogenizing the neighborhoods. For instance, the poor may converge to areas that provide services valued by the poor. Following Alesina et al. (1999) seminal work, other authors have tried to firmly establish the link between fractionalization and collective action or public goods. Miguel and Gugerty (2005) found a negative relationship between ethnic fractionalization and school funding and infrastructure in Kenya. One caveat to their work is that it may not be immune from Tiebout's sorting as well, although the authors use different specifications to address this issue. Banerjee and Somanathan (2001) have tried to tackle the issue of reverse causality by using caste fragmentation data from the 1931 Census to explain the provision of public goods in the 1970s and the 1980s in India, which makes sense given the low level of mobility in the rural parts

of the subcontinent. Regressing the proportion of villages in districts having access to a particular good, they found fractionalization had a negative impact on nearly half of the selected public goods, while it had a positive significant effect for 10% of them. Interestingly, Banerjee and Somanathan (2001) admit that the fragmentation measure may be a proxy for inequality and as the relatively rich can be effective at getting the goods to their villages. In a similar analysis, Banerjee et al. (2005) found that caste fragmentation has a significant negative impact on 10 out of 26 public goods and a positive significant impact on 3, thus providing more mixed results about the relationship. Moreover, Somanathan et al. (2006) found that caste heterogeneity had no impact on collective action regarding the preservation of a common forest in the Indian Himalayas. The detrimental role of social fragmentation in the provision of public goods is not definite, as evidenced by this short literature review.

It is important to note that most of the empirical work cited so far, have been conducted on a rather aggregate level and has primarily been concerned with the level of public goods. Micro data may bring out a different story. Four studies are of particular interest : those of Dayton-Johnson (2000), Bardhan (2000), Khwaja (2009) and Anderson (2007). Their results however should be handled with care due to data scarcity. Looking at 48 irrigation systems and maintenance indicators in Mexico, Dayton-Johnson (2000) found that social heterogeneity has both a direct negative effect by lowering cooperative efforts and a positive indirect one by making a group less likely to select the poorly performing allocation rule, so that its indirect effect on cooperation is positive. Economic inequality is found to lower cooperative effort, although its impact is U-shaped. Besides, economic inequality has an indirect effect on cooperation via its effect on the choice of the distributive rule. Bardhan (2000) found similar results looking at 48 irrigation systems maintenance in South Indian villages. The social homogeneity variable is hardly found significant, while inequality is found to have a significant U-shaped impact although it is twofold. On the one hand, inequality's direct effect is negative, while, on the other hand the indirect effect, working through the cost sharing rule, is positive. Khwaja (2009) also found a U-shaped effect of land inequality on projects maintenance in rural communities in Pakistan, although fragmentation's negative coefficient remained significant. Micro data analysis do not help at drawing a clearer picture of fragmentation's detrimental role to the provision of public goods, although they stress that inequality and social fragmentation are closely linked, both having direct and indirect effects that may contradict each other.

A comment made by Bardhan (2000) draws more particularly the attention. He noticed during his field study that better off farmers tend to violate water allocation rules crafted by others and respect those defined by the elite. This suggests that the latter hold public resources in a strong grip. Similarly, Anderson (2007) showed that high castes control access to water irrigation systems and are unwilling to sell water to lower castes. As groups appropriate public goods, fractionalization may have a positive impact on their provision levels. In this chapter, the relationship between fractionalization and public goods availability will be tested and then I will try to provide some evidence that some groups do capture access to publicly provided goods, in the vein of the comment made by Alesina and Ferrara (2005).

This assumption seems plausible given that caste patronage is commonly found in other areas of Indian economic life (Platteau, 1995; Srinivas, 1955) as well as in politics (Chandra, 2004).

3 Data and Main Variables

The analysis is based on data collected during the 1997-1998 Survey of Living Conditions in the northern Indian states of Uttar Pradesh and Bihar. The data set covers 2,250 households spread across 120 villages. These two states are part of what is often referred to as Indian's poverty belt and caste relationships in this region are known to be confrontational, to put it mildly. As an example, 29% of acts of violence against outcasts committed in 1998 in India took place in these two states alone[1]. This section is dedicated to the explanation of variables employed and their constructions.

3.1 Castes and Religions

Indian society has long been divided along two lines : caste and religion. After all that has been said about castes relationships in previous chapters, it probably seems straightforward that the institution of castes fosters social fragmentation. Due to positive discrimination policies, the thousands of *jatis* have been grouped into three categories by the Census of India : the Scheduled Castes and Tribes that represent 16% and 8% of the population and the rest. Within the non-scheduled the National Sample Survey identifies "other backward classes" ("OBCs") that account for 36% of the overall population[2]. A similar classification has been used in the data where castes are either upper, middle, backward agricultural ("BAC"), other backward castes ("OBC") and Scheduled Castes ("SC"). Tribes are not represented. In the sample used these group accounted for respectively 15%, 3%, 30%, 22% and 31% of the Hindu population. Please note that such a classification probably underestimates the actual social fragmentation as the so defined clusters encompass groups that do not necessarily sense that they belong to the same community. For instance an upper caste may not feel related to another upper caste.

As already mentioned, while caste is a clear-cut and well established institution among Hindus, it is also a reality among other religious groups, although not in the same plain way. Muslims and Christians seem to have inherited from the Hindu ancestors' castes. In the sample used, besides Hindus, only Muslims are represented and they are classified in either upper castes (37% of the Muslims' population) and lower castes (63%).

Faith is another factor of social fragmentation. India is reputed for its baffling religious diversity. Hindus represent 80.5% of the population. Muslims come as the

[1]Source : National Crime Records Bureau, Government of India. To be fair, these two states are also the most populated accounting for 24% of India's total population and 19% of the outcasts.

[2]The exact number of OBCs is still debated. For instance the 1979 Mandal Commission estimated that this group encompassed 52% of the population

second largest community with 138 million members (13.4%) followed by Christians (2.3%) and Sikhs (1.9%). In the states of Uttar Pradesh and Bihar on which this analysis focuses, Hindus account for respectively 80.6% and 83.2% of the population, while the rest is Muslim. In our sample 90% of the population is Hindu and 10% Muslim. Religion is an important factor of social division and is becoming increasingly so, as the riots that took place in the state of Gujarat in 2002 and its thousands of deaths have testified. The choice made in this chapter is to treat Muslim castes as yet another caste. Thus the religious divide is incorporated into the caste cleavage. This choice is discussed in section 5.3 later in this chapter.

3.2 Fractionalization and Polarization

Social fractionalization has mainly been approached through the fractionalization index calculated as follows :

$$Fractionalization = 1 - \sum_{i=1}^{n} \pi_i^2 \tag{4.1}$$

where π_i is the population's share of the i^{th} caste, assuming the population is split into n groups.

This index is largely influenced by the number of groups identified as it measures the probability that two randomly chosen individuals belong to the same ethnic group. It is a measure of diversity that does poorly at reflecting potential antagonisms. According to Montalvo and Reynal-Querol (2005) the lack of explanatory power of ethnic heterogeneity on the incidence of conflict can be attributed to the inadequacy of the fractionalization index to capture social antagonisms. A richer framework would be the one designed by Esteban and Ray (1994) where the concept of polarization is defined as the sum of interpersonal antagonisms that can arise from :

a sense of group identification : individuals feel more closely tied to their groups when they are relatively large. This is captured by the parameter $\alpha \in [0; 1.6]$ As such, polarization puts the emphasis on the population's frequency in each group.

a sense of alienation with respect to other groups materialized by intergroup distances, noted b_{ij}.

The Esteban and Ray (1994) polarization index can be written as :

$$P_{ER} = P(\alpha, b) = K \sum_{i=1}^{n} \sum_{j \neq i} \pi_i^{1+\alpha} \pi_j b_{ij} \tag{4.2}$$

where π_i is the population's share of the i^{th} group and $K > 0$ is used for population normalization. If intergroup distance represents the difference in groups' incomes and for $\alpha = 0$, the P_{ER} index is very close to an intergroup Gini coefficient. The larger α the further away the polarization measure moves from the Gini coefficient.

The Esteban and Ray (1994) polarization index was initially designed as a measure of wealth or income polarization. As Montalvo and Reynal-Querol (2002) pointed out, the indicator is difficult to implement given that it depends on the identification and the selection of economic groups which may be arbitrary and by all

means far from obvious. For computational simplicity, Montalvo and Reynal-Querol (2002) have derived a special class of polarization index where $b_{ij} = b_i = 1$. The polarization index can therefore be written as :

$$P_{MRQ} = P(\alpha, 1) = \sum_{i=1}^{n} \pi_i^{1+\alpha} \pi_j \tag{4.3}$$

Please note that for $\alpha = 0$, $P_{MRQ} = Fractionalization$. The larger α, the weaker the correlation between the fractionalization index and the polarization measure. The correlation may even turn negative for large values of α. The parameter α may be viewed as measuring the polarization's sensitivity. Although the implementation of P_{MRQ} is much easier, this indicator totally irons out the heterogeneity in intergroup distances and the fact that such a distance may largely depend on the distribution of income. This last point is particularly touchy when it comes to Indian castes as the ritual hierarchy may modulate intergroup distance and where the ascendance enjoyed by a caste is highly dependent upon its relative wealth. For instance, the perceived distance between outcasts and backward caste is likely to be larger than between upper castes and middle castes. A thorough discussion of this point is left for future research as it is beyond the scope of this chapter.

In order to test the relationship between social fractionalization and public goods provision, P_{MRQ} will be used as an explanatory variable for three values of $\alpha = 0; 0.8; 1.6$. Please bear in mind that the larger α, the more emphasis is put on potential groups antagonisms. The impact of the polarization index is therefore expected to increase with α, under the assumption that social heterogeneity undermines public goods provision through a sharpened opposition between the groups.

The sample is highly fractionalized. The fractionalization index ranges from 0 to 0.8 with a mean of 0.6 and a standard deviation of 0.18. As a comparison, the index value reported by Alesina et al. (1999) in the United States ranges from 0.02 to 0.61 with a mean of 0.26 and a standard deviation of 0.14. The index based on the 1971 Census of India reported by Banerjee and Somanathan (2007) at a district level ranges from 0.2 to nearly 1 and has a mean of 0.9. Fractionalization also seems to be higher in village where upper castes are dominant a shown in table 4.1 :

Tab. 4.1 – Fractionalization indices in sub-samples

	Number of observations	Mean	Standard Deviation	Minimum	Maximum
Villages dominated by upper castes	53	0.64	0.13	0.12	0.80
Villages dominated by BAC	37	0.57	0.15	0.00	0.77
Other villages	30	0.54	0.25	0.00	0.78
Whole Sample	120	0.60	0.18	0.00	0.80

3.3 Fractionalization and Patronage

Patronage is defined here as providing benefits to members of one's own group, such as access to public goods at the expense of others. This is close to the concept of parochial altruism developed in Bowles and Choi (2007). Should such a phenomenon occur, publicly provided goods would resemble more club goods than public ones and untouchability practices investigated in the previous chapter as well as the survey by Shah et al. (2006) provide some support to this hypothesis.

If publicly provided goods become "patronage" goods, all the arguments in favor of the negative role played by social fragmentation in public goods provision do not hold. Indeed, if goods are not public anymore and their use is restrained to a particular group, there is no need anymore for intergroup collective action. All the elements that could undermine cooperation become inoperative. On the other hand, cooperation within the group becomes central. There are many reasons to believe that cooperation within a group is more easily achieved. First, potential sanctions for non cooperative behaviors may be more effective due to repeated interactions. Second, behavioral experiments have shown that individuals are more altruistic towards in-group members and thus may be more prone to collective actions.[3]. Third, social antagonisms may even reinforce cooperation within the group. For instance, Voors et al. (n.d.) and Bellows and Miguel (2009) found from field experiments that having experienced war does increase local collective action and shifts social preferences towards increased altruism. We may push the analysis a notch further. Let's suppose that social heterogeneity does indeed leads to strong groups antagonisms[4]. As suggested by Bowles and Choi (2007), strong antagonisms may go hand in hand with the preponderance of "parochial altruist" behaviors, a term coined by the authors which encompasses the definition given to patronage in this chapter. Thus, this correlation may induce a positive effect of social fragmentation on the provision of club goods. Whether we posit that social fragmentation induces conflict or not, arguments can be made to say that collective action within an homogenous group is more easily achieved.

Should each group succeed in creating a collective action for the demand of a good, the larger the number of groups, the higher the likelihood that at least one of them obtains satisfaction. The fractionalization index being directly and positively related to the number of groups, a positive relationship between the presence of the goods and the index may be found. On the other hand, the polarization index would not have any effect. In short, whenever access to publicly provided goods is restricted, social fragmentation and public goods provision may increase together.

The relative size of the groups is also important. Alesina et al. (2000) designs a model where public employment is viewed as a redistribution of income in favor of some groups. The authors theoretically show that in a society composed of two groups for such a redistribution to take place, the size of the minority must be large enough, which in turns increases the fractionalization index. In an empirical analysis,

[3]Examples include Hoffman et al. (1996), Chen and Li (2009)

[4]this is for the sake of the argument given that, as mentioned earlier this assumption lacks actual evidence

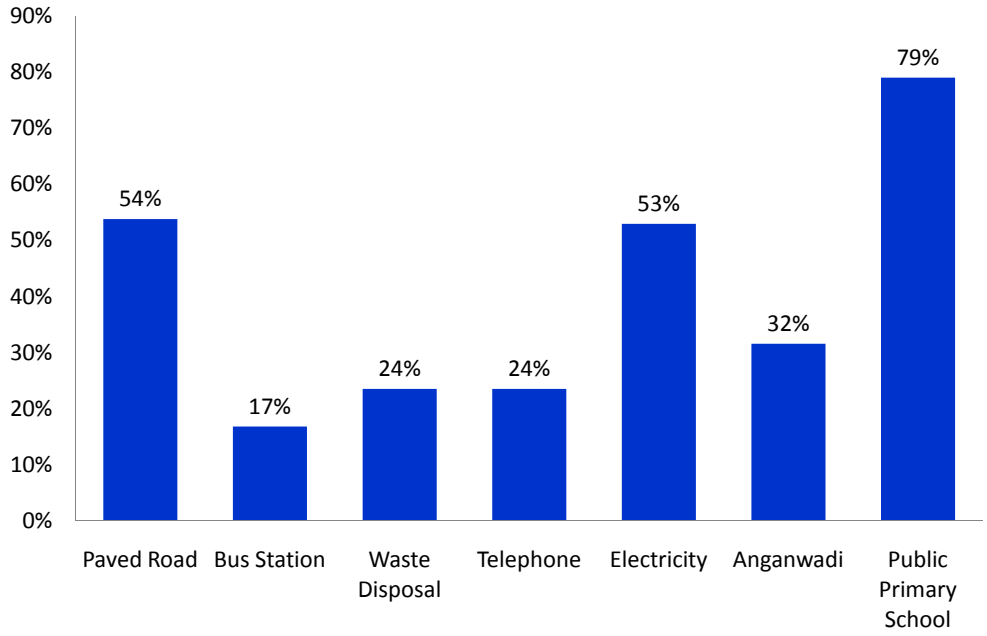
the authors find a positive relationship between the fractionalization index and the extent of public employment. Yet, their reasoning rests on vote-catching strategies that probably are directly applicable neither to public goods, not to relatively small villages in northern India.

To the best of my knowledge, there is no theoretical model that clearly associates patronage and public goods provision. Thus, the above reasoning rests mainly on intuitions about the relationship that may exist between the two. Nevertheless, the positive empirical relationship found by Alesina et al. (2000) provides some support.

3.4 Selected Public Goods

The aim of this study is to assess the probability for a village to be connected by road, bus, to the electric and phone networks or to have an anganwadi center (i.e. child development centers), a public primary school or a waste disposal system available in the village depending on village's characteristics. Figure 4.1 below show the distribution of these publicly provided goods in the villages considered.

FIG. 4.1 – Share of Villages Having the Following Goods



It is worth mentioning that our strategy may be thwarted by governments autonomy in implementing public goods. Indeed authorities may decide on an allocation independently from the social composition of the villages or the districts. Given that public goods provision is central to many development programs, authorities may want to increase their efforts in poor regions that may also be the most fragmented ones. For instance, the Indian state has made an important commitment to pubic

goods provision. "In 1968, the ruling Congress Party brought out the National Policy on Education, which made a commitment to universal primary education. The Minimum Needs Program of 1974-75 set down explicit norms about access to public goods in rural areas [...] Indira Gandhi made the removal of poverty (*Garibi Hatao*) the cornerstone of her successful election campaign in 1971" (Banerjee et al., 2008). Since these campaigns had been on for more than 20 years up to 1997-98 when the data were collected, governments had time to make those goods available across the country, irrespective of village characteristics. This may be especially true of education, as the spread of educational facilities has long been a priority of many governments. Indeed in our sample, 94 out of the 120 villages had primary public schools. In villages without a public primary school, more than half households have access to it within less than 1km.

3.5 Wealth Inequality

Inequality should be inserted in the analysis on two grounds. First, I need to make sure that the impact of social fractionalization is not proxying that of inequality. Second, a differing effect of within and between group inequality may provide some hints that between group relationships are not as important as the ones within the groups, which in turn may provide some support to the patronage assumption. Indeed, if access is restricted to members of one group, cooperation between the groups and its determinants are not relevant any more, as far as public goods provision is concerned. Only the cooperation within the group matters. Inequality between the groups would therefore have very little explanatory power. However, it is difficult to anticipate the impact of within group inequality on the presence of publicly provided goods. On the one hand, greater inequality may undermine collective action within the group by increasing its heterogeneity. On the other hand, relatively wealthy individuals may act as patrons and promote collective action in exchange for social prestige, as underlined by Olson (1965). In this last case, inequality would favor the emergence of patrons.

Wealth concentration is quite significant in our sample. On average, the largest landowner owns 31% of the village's lands, ranging from 14% to 92%. In villages where land is most equally distributed land value ranges between 0.4 and 0.9 million rupees, while in villages exhibiting the most unequal distribution, it varies from 5,800 rupees to 14 million rupees. The individual Gini coefficient ranges from 0.3 to 0.9 with a mean of 0.54 and a standard deviation of 0.11. Please note that the largest land owners are the upper castes in 45% villages of the sample, backward agricultural castes in 31%, Muslims in 13%, other backward castes ("OBC") in 8%, Scheduled Castes and Tribes in 38%.

Wealth inequality is measured by a Theil index which can be advantageously broken down into between and within group inequality. The Theil index has been computed following Deshpande (2000b) and Darity and Deshpande (2000). Suppose that individuals are arranged into n mutually exclusive groups, $g_1, ..., g_n$, each with m_j individuals. Define y_j and π_j as group's j average wealth based on land value and population's share respectively and $\overline{y}$ as the population's average wealth. Let's

write $R_j = \frac{y_j}{\overline{y}}$. Then between group inequality can be written as :

$$bgi = \sum_{j=1}^{n} \pi_j R_j \log R_j \tag{4.4}$$

and within group inequality as :

$$wgi = \sum_{j=1}^{n} \pi j R_j T_j \tag{4.5}$$

with for every individual i belonging to group g_j i.e. $i \in g_j$

$$T_j \equiv \frac{1}{m_j} \sum_{i \in g_j} r_i \log r_i \tag{4.6}$$

where r_i is the ratio of individual wealth to mean wealth for group j. Overall inequality can then be written

$$Theil = bgi + wgi \tag{4.7}$$

This decomposition of the overall inequality into between and within group inequality will prove useful as it allows to identify which sort prevails. In the event of patronage, within group inequality is expected predominate.

4 Empirical Strategy

The analysis comes in three steps. First, the impact of the fractionalization and polarization indices on the presence of public goods within the 120 villages will be tested. A probit model is used and will be detailed in the next paragraph. Second, I will check that the relationship does not arise from (i) the dominant caste, (ii) the state in which the village is located, (iii) a proxy for the impact of inequality. This analysis will be referred to as the fractionalization/polarization models. Lastly, in order to investigate the possibility of caste based patronage, a probit model will be used to assess whether a household's likelihood to access a publicly provided good is influenced by the household's membership to the dominant caste, provided the good is available in the village. This model is labeled patronage model.

4.1 Fractionalization / Polarization Model Specification

The model is a probit that assesses the probability for the village i to have the good j available as :

$$P(Y_{ij} = 1) = F(\alpha P_i + \beta \pi_i + \gamma \sigma_i) \tag{4.8}$$

where F is the standard normal cumulative distribution function, P_i the polarization index P_{MRQ} defined in section 3.2 for three levels of $\alpha = [0; 0.8; 1.6]$. Please recall

P_{MRQ} is the fractionalization index for $\alpha = 0$. π_i is a set of village population characteristics such as average income, the number and average size of households and the percentage of households whose head is illiterate and whose primary source of living is their own farm. The first three population characteristics are expected to have a positive impact while the effect of the last one is likely to be negative, given that it proxies the village's remoteness. σ_i represents the number of third parties interventions such as government or NGO programs in the village in the last twelve months. The variable is included to account for the institutions' autonomy in deciding to provide public goods as discussed in section 3.4. This measure is approximate given that the it only encompasses programs implemented during the last twelve months. Please note that neither the number of programs nor the average or total money allocated are significantly correlated with fractionalization (please refer to table 4.33 in appendix).

4.2 Patronage Model Specification

The aim of this model is to appraise whether belonging to the village's dominant caste significantly and positively influence households' access to public goods. The retained definition for dominant caste is the one that owns the largest share of land[5]. The sample is restricted to villages where the good considered is available. Let's note the main variables as follows :

$P(Y_{hj})$ the probability that household h has access to good j when this good is available in the village

X_{hk} is a vector of observations for household h on k variables such as the value of the land owned, the size of the household, the age of its head and whether he is literate.

C_h is a set of dummy variables that account for household h caste.

D_{ic} is a vector of dummies for the dominant caste c in village i in which household h lives.

The equation to be estimated is therefore :

$$P(Y_{hj} = 1) = F(\beta_k X_{hk} + \delta_c D_{ic} + \gamma_1 C_h + \gamma_2 (C_h \times D_{ic})) \tag{4.9}$$

where F is the standard normal c.d.f. $P(Y_{hj}$ is the probability for household h to have electricity at home when the village is electrified or to send children to school when school is existing in the village, for instance. Comparing coefficients γ_1 and γ_2 should give an indication of whether belonging to the dominant caste alters the probability to access public goods. If this turns out to be the case, the assumption that patronage is taking place would be reinforced. A note of caution is necessary. Assume γ_2 is significant. The only conclusion that may be drawn, based on econometric ground is that either the effect of caste membership differs depending on the dominant caste, or the effect of the dominant caste is altered by the household's caste. While none of these two explanations may be ruled out, the first one makes intuitively more sense.

[5]The definition of dominance retained follows that given by Beteille (1965)

4.3 Identification Issues

4.3.1 Reverse Causality

Many empirical works on the impact of fractionalization on the provision of public goods have been disturbed by a reverse causality issue evidenced by Tiebout (1956). Together with Miguel and Gugerty (2005) and Banerjee and Somanathan (2007) I believe that this issue is not so manifest in developing countries, given that geographical mobility often results in losing the critical advantages taken from local networks. Moreover, Rosenzweig and Stark (1989) showed that migrations in India are mainly due to women for the purpose of marriage as their mobility helps at mitigating households' income risks and at smoothing consumption. The 2001 Census of India indicates that in the states of Uttar Pradesh and Bihar, 81% and 89% of migrants are women out of which 82% and 87% migrate for marriage purposes, thereby confirming that Tiebout's sorting may not play a significant role, at least in this part of India.

4.3.2 Substitution

Banerjee and Somanathan (2007, 2001) brought up the issue of substitution across public goods. "Neglected populations may not get less of every public good - they may simply be given less valuable goods. Villages without access to a hospital may receive some type of less elaborated health facility for reasons of equity or as part of a political mechanism aimed at pacifying them". Two reasons lead to believe that substitution is not much of an issue in the analysis : (i) I use the presence of a particular good in villages rather than budget shares and (ii) selected public goods do not provide the same kind of services, that are by no mean comparable. It would make little sense to judge whether electricity is to be preferred to schools. To be on the safe side, I try to control for the substitution effect by introducing two binary variables that represent whether the village is dominated by the upper castes or backward agricultural castes.

5 Results

5.1 Estimation Of The Fractionalization / Polarization Model

Results from the estimation of 4.8 are presented in table 4.2 on next page. Coefficients associated with the fractionalization index are significant for 5 of the 7 goods considered and positive for 4 of them. These results are at odds with the findings of previous studies that stressed the null or negative impact of fractionalization on public goods provision. Only the availability of public primary schools is negatively influenced by social heterogeneity. As will be shown later, the case of public primary school is special given that this type of infrastructure is widespread and its access exempt from patronage.

The effect of a one standard deviation increase from the mean value of the fractionalization index is presented at the bottom of table 4.2. For the average value of the explanatory variable, including the fractionalization index, the probability for a village to be connected by road is 53.4%. An increase by one standard deviation from the average value of the fractionalization index, holding other factors at their means, yields a probability of 68.2%. The effect of such a change is an increase by 15% in the likelihood to have a road. A similar analysis is run for the presence of other goods.

As observed in section 3.2, villages that are dominated by upper castes are also the most fractionalized. In order to make sure that the above results for the fractionalization index does not stem from the effect of the dominant caste, two binary variables indicating whether upper castes or BAC castes are dominant are introduced in equation 4.8. Results are presented in table 4.3 below. This does not modify the significance of the coefficients associated with the fractionalization index. Goods whose availability was significantly influenced by fractionalization remain the same between table 4.2 and table 4.3. Nevertheless, the dominant caste has a positive significant impact on the presence of electricity, telephone and public primary school in the village. In subsequent estimations, these two binary variables will therefore be included.

TAB. 4.2 – Fractionalization Model - Base Specification

	Road	**Bus**	**Waste Disposal**	**Telephone**	**Electricity**	**Anganwadi Centers**	**Public Primary School**
Fractionalization (P_{MRQ} for $\alpha = 0$)	2.120***	0.847	2.396*	2.163**	0.467	1.441**	-1.602*
	(0.003)	(0.499)	(0.054)	(0.012)	(0.533)	(0.049)	(0.089)
Average household's income	0.000	0.000	-0.000***	0.000	0.000	0.000	-0.000*
	(0.259)	(0.567)	(0.004)	(0.644)	(0.119)	(0.130)	(0.077)
Number of households in the village	0.000	0.002**	0.001	0.001	0.001	0.001	0.007***
	(0.926)	(0.028)	(0.152)	(0.208)	(0.233)	(0.142)	0.000
Average household's size	-0.091	-0.23	0.330*	-0.179	-0.115	0.093	0.087
	(0.530)	(0.194)	(0.059)	(0.240)	(0.430)	(0.525)	(0.603)
Nb of programs (NGO)	0.074	-0.419	-0.433	0.274	0.364**	0.182	0.059
	(0.691)	(0.101)	(0.239)	(0.156)	(0.030)	(0.342)	(0.819)
Nb of government's programs	0.274**	0.462**	-0.340*	-0.287	0.073	0.449**	0.076
	(0.040)	(0.012)	(0.089)	(0.121)	(0.631)	(0.011)	(0.670)
% of households living from their own farm	-1.547**	-2.447***	-0.338	-1.369*	-0.65	-0.57	-0.072
	(0.028)	(0.008)	(0.638)	(0.076)	(0.347)	(0.432)	(0.931)
% of households heads illiterate	-1.333*	-1.922*	-1.434	-2.093**	-2.180***	-1.463*	-0.386
	(0.099)	(0.061)	(0.195)	(0.013)	(0.010)	(0.083)	(0.711)
Constant	0.791	1.32	-2.116	0.212	0.815	-1.335	0.422
	(0.499)	(0.335)	(0.150)	(0.866)	(0.516)	(0.258)	(0.771)
Number of observations	116	116	116	116	116	111	116
Probability for mean values of independent	53.4%	9.6%	15.0%	16.3%	53.6%	29.5%	88.1%
Impact of a 1sd increase in fractionalization	14.7%		12.7%	11.0%		9.6%	-6.6%

Robust p values in parentheses

* significant at 10% ; ** significant at 5% ; *** significant at 1%

TAB. 4.3 – Fractionalization Model - Specification Including Dominant Castes

	Road	**Bus**	**Waste Disposal**	**Telephone**	**Electricity**	**Anganwadi Centers**	**Pub. Prim. School**
Fractionalization	1.907**	0.739	2.193*	1.991*	0.106	1.251	-2.208**
	(0.011)	(0.561)	(0.068)	(0.057)	(0.897)	(0.103)	(0.032)
Upper caste dom.	0.474	0.173	0.21	1.347***	0.698**	0.366	0.880**
	(0.188)	(0.687)	(0.581)	(0.004)	(0.047)	(0.300)	(0.016)
BAC caste dom.	0.337	0.154	-0.227	1.177**	0.713*	0.223	0.213
	(0.368)	(0.745)	(0.583)	(0.018)	(0.054)	(0.560)	(0.594)
Nb. of obs.	116	116	116	116	116	111	116

Robust p values in parentheses
* significant at 10% ; ** significant at 5% ; *** significant at 1%
All specifications include control variables such as mean households' income, the number of households and their average size, the number of programs, and the percentage of households living from their own farm

The production of some goods require an intervention from the state or the district's administration. As pointed out in section 3.4 these authorities may decide independently to allocate public goods and such autonomy needs to be controlled for. Unfortunately, the limited number of data prevents from introducing district fixed effects. Nevertheless, a binary variable is introduced for Bihar, one of the two states on which our study focuses. Results are presented in table 4.4 below. This amendment did not modify the coefficients associated with the fractionalization index. The previously significant ones remain so and their signs are unchanged. Yet, given that the Bihar variable has a significant impact on the provision of electricity and public primary schools it will be included in the following estimations.

TAB. 4.4 – Fractionalization Model - Specification Including Dominant Castes and State Fixed Effect

	Road	**Bus**	**Waste Disposal**	**Telephone**	**Electricity**	**Anganwadi Centers**	**Pub. Prim. School**
Fractionalization	1.914**	0.795	2.305*	2.012*	0.026	1.263*	-2.300**
	(0.011)	(0.531)	(0.071)	(0.054)	(0.977)	(0.097)	(0.049)
Upper caste dom.	0.461	0.255	0.203	1.352***	0.675**	0.338	0.999***
	(0.200)	(0.561)	(0.598)	(0.004)	(0.046)	(0.335)	(0.008)
BAC caste dom.	0.328	0.181	-0.19	1.185**	0.725*	0.185	0.296
	(0.379)	(0.705)	(0.653)	(0.017)	(0.051)	(0.632)	(0.466)
Bihar	-0.195	0.624	0.714*	0.092	-1.182***	-0.34	1.104***
	(0.578)	(0.229)	(0.093)	(0.813)	(0.002)	(0.367)	(0.009)
Nb of obs.	116	116	116	116	116	111	116

Robust p-values in parentheses
* significant at 10% ; ** significant at 5% ; *** significant at 1%
All specifications include the control variables displayed in table 4.2

The literature review emphasized how closely tied is fractionalization to inequality and how difficult it is to untangle their respective impacts. In order to ensure that the fractionalization's effect found is not a proxy for that of inequality, the

Theil index and its two parts detailed in section 3.5 are introduced in the equation that is estimated anew. Results are presented in table 4.5 hereafter.

The fractionalization's coefficients loose their significance for the presence of waste disposal systems and telephone due to the introduction of the Theil index. Yet, in the first case, the coefficient is close to the 10% threshold and recovers its significance when the index components are separately introduced in the equation. Thus among the 4 goods whose presence was significantly and positively influenced by fractionalization, three remain so. Please note that inequality has a mere impact on public goods provision and the coefficients pattern does not allow to draw sound conclusions about which sort of inequality prevails. Nevertheless, the fractionalization's coefficients seem somewhat robust to controlling for measures of inequality.

TAB. 4.5 – Fractionalization Model - Inequality Variables

	Road		**Bus**		**Waste Disposal**		**Telephone**		**Electricity**		**Anganwadi Centers**		**Pub. Prim. School**	
Fractionalization	1.656*	1.748*	-0.405	-1.42	1.977	2.923*	1.282	0.994	-0.204	0.21	2.052**	1.902**	-2.894**	-3.337**
	(0.072)	(0.077)	(0.800)	(0.370)	(0.155)	(0.062)	(0.303)	(0.441)	(0.839)	(0.844)	(0.034)	(0.050)	(0.030)	(0.020)
Theil index	-0.026		0.025		-0.02		0.055		0.188***		-0.777**		0.191	
	(0.563)		(0.433)		(0.593)		(0.139)		(0.001)		(0.049)		(0.172)	
Between group inequality		-0.185		1.160*		-1.409*		0.388		-0.744		-0.42		0.895
		(0.698)		(0.050)		(0.083)		(0.494)		(0.116)		(0.461)		(0.166)
Within group inequality		-0.025		0.009		-0.02		0.055		0.267		-1.490**		0.12
		(0.565)		(0.792)		(0.589)		(0.138)		(0.133)		(0.036)		(0.264)
Number of observations	109	109	110	110	109	109	110	110	109	109	106	106	110	110

Robust p-values in parentheses
* significant at 10% ; ** significant at 5% ; *** significant at 1%
All specifications include the control variables displayed in table 4.2 as well as dominant castes and Bihar dummies

From the 5 specifications tested so far, we may conclude that if fractionalization is to have an impact on the presence of public goods, which is the case for 4 to 5 of the considered goods, this effect is positive for 3 to 4 of them, which is at odds with theoretical conclusions. Yet, the latter rested on the assumption that social fragmentation induces tensions between the groups, that the polarization index is more likely to capture. Therefore the fractionalization indicator will be replaced by the polarization index for two values of $\alpha = 0.8$ and $\alpha = 1.6$. Please recall that α measures the polarization sensitivity. Results from this estimation are presented in table 4.6 below :

Tab. 4.6 – Polarization indices - Base Specification

	Road	**Bus**	**Waste Disposal**	**Telephone**	**Electricity**	**Anganwadi Centers**	**Pub. Prim. School**
Fractionalization	2.120***	0.847	2.396*	2.163**	0.467	1.441**	-1.602*
(P_{MRQ} for $\alpha = 0$)	(0.003)	(0.499)	(0.054)	(0.012)	(0.533)	(0.049)	(0.089)
Polarization	5.718***	0.422	2.292	6.702**	0.08	7.745**	-4.502
(P_{MRQ} for $\alpha = 0.8$)	(0.007)	(0.908)	(0.289)	(0.017)	(0.973)	(0.024)	(0.108)
Polarization	4.135	-2.961	-4.758	2.959	-2.817	6.987	-4.959
(P_{MRQ} for $\alpha = 1.6$)	(0.299)	(0.624)	(0.261)	(0.500)	(0.519)	(0.148)	(0.276)
Nb. Obs.	116	116	116	116	116	111	116

Robust p-values in parentheses
* significant at 10% ; ** significant at 5% ; *** significant at 1%
All specifications include the control variables displayed in table 4.2

As α increases, more emphasis is put on potential social antagonisms, and coefficients lose their significance. If polarization is to have an impact on the presence of public goods, it is restricted to intermediate levels of α. Contrary to theoretical assumptions, groups' opposition does not impact the provision of public goods. In order to check the robustness of these results, the Bihar and dominant castes binary variables are entered in the equation. Results are presented in table 4.7. Coefficients are hardly modified. Table 4.8 presents the estimations when the Theil coefficient is introduced in the equation.

Once the inequality measure is included, only the presence of a bus service becomes negatively influenced by polarization. Nevertheless fractionalization and polarization do, for an intermediate level of α, either have no impact or a positive one the presence of other public goods, except public primary school, whose case, according to the series of results, is likely to be apart.

5.2 Summary of The Results from The Fractionalization /Polarization Model

By and large, if fractionalization has an impact on the availability of public goods provision, it is likely to be positive if not null, which contradicts theoretical reasoning. On the other hand, polarization, which should, according to theoretical premises, have a stronger explanatory power is not found to have an impact on the presence of public goods, especially as the stress put on social antagonisms increases.

TAB. 4.7 – Polarization indices - Introducing caste dominant and Bihar variables

	Road	**Bus**	**Waste Disposal**	**Telephone**	**Electricity**	**Anganwadi Centers**	**Pub. Prim. School**
Fractionalization	1.914**	0.795	2.305*	2.012*	0.026	1.263*	-2.300**
(P_{MRQ} for $\alpha = 0$)	(0.011)	(0.531)	(0.071)	(0.054)	(0.977)	(0.097)	(0.049)
Polarization	5.129**	-0.322	2.074	5.580*	-1.374	8.583**	-6.363**
(P_{MRQ} for $\alpha = 0.8$)	(0.028)	(0.929)	(0.352)	(0.076)	(0.636)	(0.023)	(0.049)
Polarization	3.661	-4.459	-4.763	0.112	-5.122	8.997	-5.327
(P_{MRQ} for $\alpha = 1.6$)	(0.388)	(0.444)	(0.293)	(0.983)	(0.307)	(0.123)	(0.262)
Nb. Obs.	116	116	116	116	116	111	116

Robust p-values in parentheses
* significant at 10% ; ** significant at 5% ; *** significant at 1%
All specifications include the control variables displayed in table 4.2 as well as dominant caste and Bihar dummies

TAB. 4.8 – Polarization indices - Introducing Theil Index

	Road	**Bus**	**Waste Disposal**	**Telephone**	**Electricity**	**Anganwadi Centers**	**Pub. Prim. School**
Fractionalization	1.656*	-0.405	1.977	1.282	-0.204	2.052**	-2.894**
(P_{MRQ} for $\alpha = 0$)	(0.072)	(0.800)	(0.155)	(0.303)	(0.839)	(0.034)	(0.030)
Polarization	3.341	-6.281*	0.302	5.457	-1.487	8.211**	-6.281*
(P_{MRQ} for $\alpha = 0.8$)	(0.235)	(0.067)	(0.914)	(0.248)	(0.645)	(0.026)	(0.060)
Polarization	-0.445	-12.499**	-7.945	0.575	-3.125	5.414	-3.232
(P_{MRQ} for $\alpha = 1.6$)	(0.921)	(0.028)	(0.144)	(0.935)	(0.555)	(0.370)	(0.554)
Nb. Obs.	109	110	109	110	109	106	110

Robust p-values in parentheses
* significant at 10% ; ** significant at 5% ; *** significant at 1%
All specifications include the control variables displayed in table 4.2 as well as dominant caste and Bihar dummies and Theil index

Thus, why would only indices close to fractionalization be significant when other measures of polarization are not ? Let's recall that the fractionalization index is closely and positively linked to the number of groups in the society. The index is maximized at the uniform distribution of the population across groups. Polarization on the other hand is decreasing in the number of groups and maximized when the population is clustered into two equally sized groups. Given the results obtained so far, the number of groups seems to positively influence public goods provision, while groups antagonisms do not play any role. A possible explanation might be patronage. Suppose that each castes tries to appropriate the public goods, thereby turning the publicly provided goods in club goods. Each caste doing the same might beget the number of groups, and hence fractionalization, to be positively correlated with public goods provision. This is an assumption that is worth exploring, although given that I test for the presence of the public goods rather than the level of provision, the only inroad I can make in this direction is to test whether membership to the dominant caste modifies the likelihood for a household to access public goods. This is what the following section does.

5.3 Patronage Model

The Patronage model is only tested for the backward agricultural caste ("BAC") for two reasons. Fist, BAC and upper castes are the only dominant castes for the bulk of the sample. BAC members own the largest value of land in 31% of the villages under study. Second, the case of upper castes needs to be set aside given that membership to this group is a perfect predictor of having electricity at home or of primary school attendance. Due to this lack of variation, the case of the villages dominated by upper castes is left apart.

Table 4.9 presents the results from the estimation of equation 4.9. The explained variable is the probability for a household to have toilets at home when a waste disposal system is available in the village, to have electricity when the village is electrified, or to send their children anganwadi or to school when these facilities are located in the village. Belonging to a BAC caste significantly reduces the likelihood of anganwadi attendance or to have a toilet facility except when the village is dominated by backward agricultural castes. The likelihoods for a BAC household in a village not dominated by BACs to have toilets or to send their children to an anganwadi center are both around 5%. Yet, this same probabilities in a BAC dominated village are 31% and 15% respectively [6]. Similarly the coefficient associated with the interacted variable is close to the 10% threshold with respect to electricity access, meaning that a BAC household is more likely to have electricity at home when its caste is dominant in the village[7]. On the other hand, primary school attendance is influenced neither by the household's caste nor by the village's dominant caste. None of the household's characteristics seems to have a significant impact on primary school attendance. As observed earlier, primary school education is now relatively widespread in India. Out of the 841 households with children of primary school age, 792 were actually sending these children to school. Please note that these results are not driven by the fact that living in a BAC dominated village gives better access to public primary school as testified by the coefficients associated with the variable *BAC village*.

These results provide some support to the hypothesis that there is patronage taking place with respect to access to publicly provided goods. This assumption would explain why fractionalization is found to have a positive effect on the provision of public goods while polarization proved irrelevant. Please recall that fractionalization had a negative impact on the presence of public primary school. According to table 4.9 access to this facility is independent from households' characteristics. Given what has been said in chapter 3 of this dissertation and the results found in this study, provide converging clues that public provided goods in India may be turned into club goods due to the social structure.

[6] Holding other factors constant at their mean values

[7] assuming the interacted term to be significantly different from 0 this would yield an increase by 9in the likelihood to have electricity from 14% to 23%

TAB. 4.9 – Patronage Model

	Toilets	Electricity	Anganwadi	Pub. Prim. School
BAC household	-0.549**	-0.065	-0.561**	-0.259
	(0.040)	(0.680)	(0.040)	(0.220)
BAC household x BAC dominant	1.162***	0.347	0.598	0.406
	(0.010)	(0.120)	(0.180)	(0.250)
BAC village	-0.608**	0.122	-0.301	0.009
	(0.020)	(0.370)	(0.240)	(0.970)
Value of land owned	9.04e-07***	1.80e-07***	-4.45E-08	-6.11E-09
	(0.000)	(0.010)	(0.900)	(0.960)
Literacy of household's head	-0.586***	-0.632***	0.194	-0.011
	(0.000)	(0.000)	(0.310)	(0.940)
Household's size	0.008	0.030**	-0.001	0.043
	(0.760)	(0.040)	(0.990)	(0.160)
Age of the household's head	0.020***	0.018***	-0.002	-0.008
	(0.000)	(0.000)	(0.830)	(0.260)
Constant	-1.986***	-1.907***	-1.001***	1.631***
	(0.000)	(0.000)	(0.000)	(0.000)
Nb. of observations	396	895	324	676
Coefficients equality test $Ho : \gamma_1 = \gamma_2$				
χ^2	7.27	1.35	3.19	1.72
P $> \chi^2$	0.007	0.2453	0.0743	0.1898

Robust p-values in parentheses

* significant at 10% ; ** significant at 5% ; *** significant at 1%

This study is rather exploratory and saying that I prove the existence of patronage would be too enthusiastic. Data scarcity is somewhat of a problem. Yet, the merit of this study is to show that the relationship between social fractionalization and public goods provision is far from obvious. As mentioned in introduction to this chapter, empirical works often found contradictory relationships depending on the goods and the settings. Moreover, government's autonomy in its allocation and poverty alleviation programs blur even more the picture. Nevertheless, these results coupled with those found in chapter 3 provide clues that publicly provided goods are not that public but rather club goods in the Indian context. This may bring on two sorts of problems. First, public goods are often the cornerstone of development programs, but if their access is not universal, these programs may miss their targets. Second, policies focus would benefit from shifting their focus from the level provision to the use of public goods. Public goods availability is a central issue for economic development and a key concern of many developing societies. As Banerjee and Somanathan (2007) recall "The National Election Survey in India, carried out

by the Center for the study of Developing Societies in 1996, asks 10,000 voters an open-ended question : "What are the three main problems people like you face today ?" Poverty was the most popular response [...] but public goods came in a close second. Nearly a fifth of all respondents listed problems associated with different types of public amenities as their main problem".

A last point needs to be made. It has been assumed in this study and in some others (Banerjee and Somanathan, 2001; Banerjee et al., 2005; Banerjee and Somanathan, 2007; Bardhan, 2000) that caste is the relevant divide. However, it could be argued that religion is a much stronger source of antagonisms than castes in India and that the polarization index should be constructed along religious lines. As religion was treated as yet another caste, the polarization index may have been underestimated while the fractionalization index was overestimated. I have to reckon that this argument makes sense especially given the context of growing religious tensions in India. It would be worth exploring whether religion is a more important source of potential antagonisms than castes. This is left for future research.

6 Concluding Remarks

In this chapter I found that the relationship between social fragmentation and the availability of public goods, if any, is likely to be positive, while polarization is irrelevant. This contradicts theoretical conclusions. Previous empirical works also produced mixed results about this relationship. One of the reasons for this lack of assent may be the assumed relationship between social heterogeneity and social tensions that may not hold as suggested by Esteban and Ray (2008). A finer understanding of the links between social diversity and conflicts might prove helpful in refining the relationship between fractionalization, polarization and public goods provision.

Suppose that as groups are formed, the build up of social identities comes with the shaping of groups opposition, be it only because individuals perceive themselves as "we" in opposition to "they". Such opposition does not necessarily translate into conflict. Social norms, a sort of modus vivendi, may be set up to rule intergroup relationships, even if they are based on avoidance. Such norms are more likely to be at work in the public space and hence in the use of public goods. Accounting for such norms is important and prevents from concluding that social heterogeneity causes antagonisms and conflicts. Naturally clashes and outbursts of violence may appear, but they may result from challenging the norms. Castes may be considered a good example of this line of reasoning. Baechler (1988) developed a theory mentioned in more details in the introduction to this dissertation that caste is the solution to a collective action problem and that they appeared to ensure social cohesion in the absence of a strong state. Thus, although caste is prima facie a factor of social division, they do not necessarily spur antagonisms or conflicts.

The argument is, at the stage of intuition but its formal demonstration would probably be very instructive. It is left for future research. Our argument does not mean all is for the best and that caste norms ought not be challenged. Yet, a better

understanding of how intergroup norms appear would help to find ways of commuting the iniquitous ones with fairer ones acceptable. This also is left for future research.

Conclusions

The four essays presented in this dissertation are examples of the implications of social institutions and identities, in this case Indian castes, in various areas of economic life.

Summary of Main Results

The effect of caste membership on perceived social identity among Hindus was investigated in Chapter 2. Results show, and this is no surprise, that caste is a strong determinant of perceived social status for both SCs and STs, although it is not the only one. Both income and the type of occupation, whether supervisory or involving human or physical capital do have a significant impact on perceived social status. Education is also relevant, although to a lesser extent and the divide lies between primary and secondary or higher education. Moreover, the impact of caste is much smaller among Scheduled Castes than among Scheduled Tribes, although their ritual status, is, arguably, quite close. Large, yet plausible shifts in income or occupation could make up for the caste effect as far as SCs are concerned. For instance, the acquisition of land or skills can almost cancel the caste effect. On the other hand, only very unlikely improvements could hardly compensate for belonging to a Scheduled Tribe. Many reasons could be invoked to explain the differing impact of caste between SCs and STs, one of them being that SCs better mobilized politically and managed to somewhat emancipate from their traditional status. This is only a conjecture that would be worth investigating. The results presented in this chapter may underestimate the actual effect of caste, as data were not publicly collected. It seems likely that if individuals had declared publicly their social class, peer pressure would have reinforced the caste effect. Moreover, the analysis was restricted to Hindus due to a lack of data on castes for individuals of other religious denominations. Yet, including a religious dimension to the analysis of perceived social status may yield compelling results, especially in the context of rising denominational tensions in India.

The indirect caste effect found in Chapter 2 is interpreted as a remainder of centuries of discrimination, through the internalization of social norms. Chapter 1 questions the origin of these discriminatory norms. It is noteworthy that a large part of the theoretical literature on discrimination cannot depart from positing that individuals do have preferences about who they interact with. In these theories, prejudice always lurks at the back. In doing so, I would argue that the question of the origin of discrimination is not properly addressed. Indeed, how come that agents pick one feature such as skin color for instance, rather than another to form preferences or prejudice ? Sociological analysis, such as the one conducted by Max Weber, suggest that social norms and ideologies come as an *a posteriori* justification of an already existing situation. As far as castes are concerned, many specialists such as Ghurye for instance [8], stressed that the founding text of the institution of castes, Manu's code, was written at a time when segregation was already in place. Thus, the following question is addressed : can segregation occur even in the absence of prejudice ? A theoretical model is constructed to answer this question that links power capture and segregation. Power is defined as the ability to provide someone else

[8] As presented by Deliège (2004)

with opportunities that would be unattainable otherwise. Because one group seizes power the powerless strive to cooperate with the mighty. In doing so they prompt rejection by the latter and, in turn, the powerless refuse to cooperate. The ending situation pictures a systematic refusal to cooperate by both groups and this how segregation is defined.

This model has several compelling features. First, it addresses an often neglected fact, namely that an unequal power distribution is frequent in segregated society. Second, segregation is shown to occur even in the absence of prejudice. Third, the way both segregation and power are defined allows to account for a variety of situations. Fourth, the process described has an interest in itself and more particularly that rejection results from the powerless striving to cooperate. Unfortunately, the model also has a couple of drawbacks. Ways for improvement are proposed at the end of the chapter such as the adoption of an evolutionary framework, the inclusion of an in between group resulting from groups intermediate cooperation and the definition of power as a function of the number of powerful. Lastly, lifestyles obligations and customs can serve as signalling devices, based on the observation that they are much more constraining for some groups than for others.

Finally, Chapters 3 and 4 investigate the role played by caste rules and solidarity in access to publicly provided goods. The institution of caste strongly defines the use of common resources mainly through the prohibition put on the sharing of these resources, particularly with outcasts. This prohibition is what is referred to as untouchability, which is grounded on the belief that outcasts are impure and that any form of contact with them is tainting. Food and water are the paramount conveyor of ritual pollution. Water is considered tainted if an untouchable or his vessel touch it. Therefore outcasts are often banned from using higher castes wells. Indian local newspapers abound with stories of untouchables being beaten up for having used higher castes wells. The phenomenon is quantitatively investigated in Chapter 3. The number of acts of violence in a district is shown to be associated with the way water is predominantly distributed. The more common and shared the source, the larger the number of acts of violence against SCs and STs. This relationship is robust to many controls, including castes and religious polarizations, states measures of wealth or of human development, fixed effects and measures of other public investments. It is noteworthy that the number of roads and of primary schools are negatively associated with the number of acts of violence. Finally, quantile regression show that the impact of water distribution on caste based violence is stronger, when the latter has already reached a relatively high level. The results presented in this chapter show that, despite untouchability practices being outlawed, they are still quite common and violently enforced. This is in accordance with the results from the survey undertook by Shah et al. (2006) that shows that untouchables are still denied access to many public goods, including water. This points towards the idea that some groups may be excluded from using public goods on caste grounds. Publicly provided goods appear more like club or caste goods. This hypothesis is investigated in Chapter 4.

Theoretical as well as empirical studies have evidenced, yet with a mild success,

that social fractionalization has a negative effect on public goods provision, through a restricted collective action. I argue that this literature exhibit four drawbacks. First, empirical results are mixed. Second, the relationship seems to rest on the implicit assumption that social fragmentation induces antagonisms or conflicts. Third, this last assumed relationship has never been firmly established and even if it was, then polarization indices would be more appropriate to account for the negative impact of social fragmentation on public goods provision than the conventionally used fractionalization index. Fourth, the intervention of ethnic patronage has hardly been considered. Yet if publicly provided goods are turned private and intended at a specific group, a positive relationship between social fragmentation and public goods provision may come to light.

These four points are addressed in this chapter and more specifically the patronage assumption. The analysis show that in the northern Indian states of Uttar Pradesh and Bihar, the fractionalization index is positively associated with the presence of four of the six selected goods. This results is somewhat at odds with those obtained by previous empirical analysis that displayed a predominantly negative effect. On the other hand, polarization indices are found to be irrelevant. It is concluded that the number of groups does positively influence the presence of public goods, while potential antagonisms between groups play little role. This positive relationship may stem from patronage activities. The last part of this chapter looks into this assumption by assessing whether the likelihood for a household to access a particular facility, provided it is available in the village, depends on its membership to the dominant caste. Results, although not definite, do provide some hint in that direction. However, data scarcity conduce to taking the results with circumspection. Nevertheless, results from the last two chapters provide some support to the hypothesis that publicly provided goods may be turned into caste goods.

Discussion

If development can be seen "as a process of expanding the real freedoms that people enjoy" (Sen, 1999a), these chapters make a case for integrating social institutions and its effect in the analysis of development. Sen highlighted five types of freedoms that are necessary to the advancement of individual capabilities. He labeled them instrumental freedoms and they are political rights, economic facilities, social opportunities, transparency, and security, which are all different but interconnected. Chapters 3 and 4 showed that the institution of castes violated at least four of these. Because public goods and facilities may be turned into caste or club goods, thereby preventing some individuals from using them, social opportunities are restricted and so are economic facilities. This would not be as much worrying if it did not bring to light the fact that in modern India, caste rules do sometimes supplant legal ones. Transparency is not achieved. As untouchability practices may still be violently enforced, the untouchables demand for security is not satisfied, which infringes another instrumental freedom.

Arguing that castes impede freedom and hence development is no big news. Lawmakers did recognize it when they crafted the Constitution of India. What is more

disturbing is that fifty years after the set up of reservation policies and acts aiming at protecting and promoting the situations of the "weaker segments of society", castes rules still prevail locally regardless of the law. Poverty alleviation programs, that, for a good part of them, rest on the provision of public goods, are diverted from their objectives and caste remain a relevant divide to analyze patterns of inequality in India. On this topic, we might question the suitability of the current increased devolution of power to village councils (*panchayats*) that may appear swift in implementing caste based rules. An assessment of the reservation and *panchayats* empowerment policies is beyond the scope of this work, yet what appears clearly from it, is the strength of castes and its influence on limiting freedoms.

As worrying such a situation may be, it is not as troublesome as the issue raised by the influence of caste on social identity. While appropriate policies could arguably deal with law disobedience and the capture of public goods access, the fact that caste shapes self-perception is fraught with consequences that are less manageable. Chapter 2 showed how determinative caste is in the perception of social class both directly, but more insidiously through a reduced capacity for deprived groups to perceive themselves as socially successful. Results from behavioral experiments showed that identifying to a group that has suffered from long standing despise may encourage individuals to act in a detrimental way. They may self discriminate either to stick to stereotypes or because they expect such a discrimination to occur. Thus, challenging the institution of caste goes through recasting social identities, which is tricky, to say the least.

Yet, all is not doom and gloom. Results from Chapter 4 suggest that primary schools are widely accessible and exempt from the influence of castes. Moreover, results presented in table 3.8 in Chapter 3 indicate that primary education facilities are negatively associated with caste based violence and so is road access. The differing impact of caste on perceived social status between SCs and STs presented in Chapter 2 indicate that the former were able to detach from their group membership. The influence of caste in the case of SCs is mainly indirect and nowhere as binding as for STs. Many reasons for this difference can be invoked, one being that SCs politically mobilized and asserted their rights and claims (Jaffrelot, 2002). On the other hand, the political assertion of STs is more feeble and they seem more trapped in the traditionally low position. Moreover, Chapter 1 showed how an unequal power distribution may induce segregation. Thus, it could be infered that the political rise of the long deprived castes might partially lift the yoke of the institution of caste.

Agenda for future research

At the end of every chapter, I have tried to discuss issues raised by the work and that would be worth exploring. For instance, an extension of the results found in Chapter 2, would be to investigate potential discrepancies between public and private declarations of perceived social status. Hoff and Pandey (2006) observed that the performance of low caste children decreased when their caste identity was made public. Such a gap is attributable, the authors argue, to the expectation of discrimination. Similarly, if we were to find any significant discrepancy between publicly and privately declared social status, we may be able to estimate the amount of expected

discrimination on top of that generated by a diminished self image.

Moreover, local social composition may be thought of having an influence on the salience of caste as a component of social identity and this would be worth testing with a larger set of data than the one used in Chapter 2. Two questions may arise from this point. First, does the salience of caste identity depends on local social composition ? For instance, would it be more relevant if the society is highly polarized, fractionalised, etc. Second, when do other identities such as the religious one supplants caste identity ? This last point is discussed in more details in the last paragraph of this conclusion.

Let's suppose that caste identity is stronger when local society is more polarized along the lines of castes. The trouble with the polarization index defined by Montalvo and Reynal-Querol (2002), and that is now commonly used, is that it only focuses on the distribution of the population irrespective of the income distribution. It assumes that the distance between all groups is equal to one. However, it is highly conceivable that inter group distance is not constant and largely depends on the collective wealth of both groups. As far as castes are concerned, the Sanskritization process described by many sociologists show that an increase in wealth is often accompanied by a attempt to increase social status and thus move closer to higher groups. It does not require a great deal of imagination to think that a sub-caste who managed to grow richer will not perceive the social distance to the next higher up group in the same way than than poorer ones. Thus, there is a need to reincorporate a flexible intergroup distance, arguably based on wealth, in the polarization index.

The original index designed by Esteban and Ray (1994) did actually focus on the wealth distribution. Yet, it was criticized on the grounds that groups design based on the income criteria is arbitrary and untractable. Both remarks remain valid. They lead to the interpretation of "groups" as ethnic, religious or caste based, which, supposedly, are less arbitrary criteria. However, if we could find and incorporate a metric that accounts for these groups collective wealths, we may be able to modulate the intergroup distance and better account for the phenomenon. Moreover, I would argue that a society that is said to be polarized because of the structure of the population distribution, is even more so if the pattern of the income distribution follows that of the ethnic groups and this should be reflected in the index, which is not the case with the polarization index popularized by Montalvo and Reynal-Querol (2002). In the case studied in Chapter 4, data show a very strong correlation with the value of the land owned and caste membership. Thus we could have taken the difference in the average value of land owned as a measure of intergroup distance. This was not done as theoretical foundations for such an index lack. Yet, this may be a way to address the problem.

Section 6 in Chapter 1 proposed improvements for the model, namely to adopt an evolutionary game framework, the conceptualization of a "mixed" group that would lie in between the powerful and the powerless and that would lead to endogenizing the power parameter. Moreover, customs or lifestyle such as vegetarianism for instance, could be included as signals or devices to enforce cooperation within the

group. As far as the institution of castes is concerned it is noteworthy that lifestyle prescriptions are more stringent for higher castes than for lower castes. This calls for an interpretation of these customs as a signal for group membership.

A more general question is posed by these four chapters. Why do agents pick a trait and define themselves according to this trait ? Let's take an example. There are many lines along which one could define himself. In India for instance this may be nationality, caste, religion, gender, age, language, geography, skin color, lifestyle, wealth, occupation and the list is probably endless. Under what circumstances will individuals stress one identity at the expense of others ? What factors make the religious denomination more relevant than gender, for instance ? This questions has many implications and let's discuss only those suggested by the dissertation. First, what makes a trait relevant to divide the society and to spur segregation ? For instance, why was segregation in the United States based on skin color, rather than, say, on height ? Why do we have prejudice against some traits rather than others ?

Second, suppose that the determinants of identity change depending on circumstances. Then how can we assess social fragmentation ? Some authors sidestepped the question by assuming that ethnic groups are relevant, probably having the examples of African civil wars at the back of their minds. What lurks at the back of the literature on ethnicity or social fragmentation is that it necessarily induces antagonisms and conflicts and that the most likely ground for conflict should be taken as the most salient identity. Then, how can we explain that ethnic identity changed status from a merely conscious phenomenon up to a reason for civil war ? Arguments have been brought forward to say that the marked distinction between the Tutsis and Hutus of Rwanda was a colonialist construction. Nevertheless, such a construction appeared a couple of years later to be sufficiently relevant to prompt the genocide of nearly half a million individuals. Thus, the question is not does ethnic fractionalization or polarization prompt conflict but rather under what circumstances does ethnicity becomes a relevant argument for conflict ? It has been suggested in Chapters 3 and 4, that caste based fragmentation does not necessarily prompt conflicts, the reason being that norms govern intergroup relationships. Outbursts of caste based violence are not seldom, but they mainly arise from norms being challenged and enforced (the equity of these norms is not discussed here). The fact that conflict arise because of challenged norms might possibly be a trail worth pursuing. In any event, all these examples highlight the interest of understanding what makes an identity more particularly salient than another. Such an investigation may also fuel the debate about whether ethnicity or identity, in general, is constructed or exogenously given.

These propositions for future research are by and large not exhaustive. They may seem ambitious, although they probably are incommensurate with the questions posed by social identity and institutions. Recent economic literature has drawn attention to them and there is little doubt that it will be a promising area for future research.

Appendix

Appendix to Chapter 2 : Social identity in India : Caste and Beyond ?

Section 2 : Data

Section 2.1 : Presentation of the Data

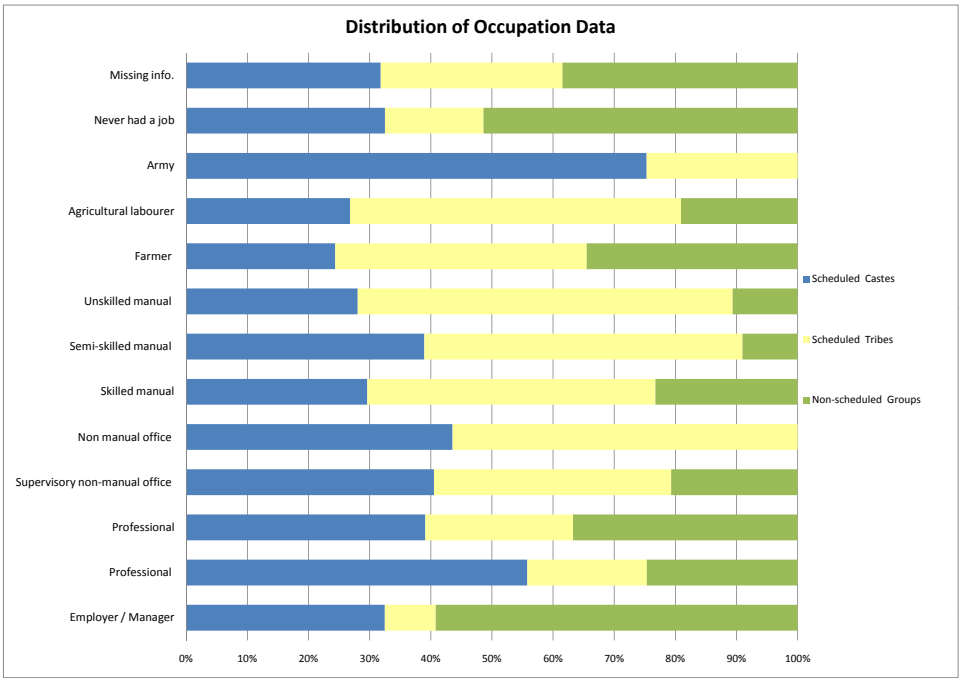
Tab. 4.10 – Pearson's χ^2 test for homogeneity of distribution of classes across castes

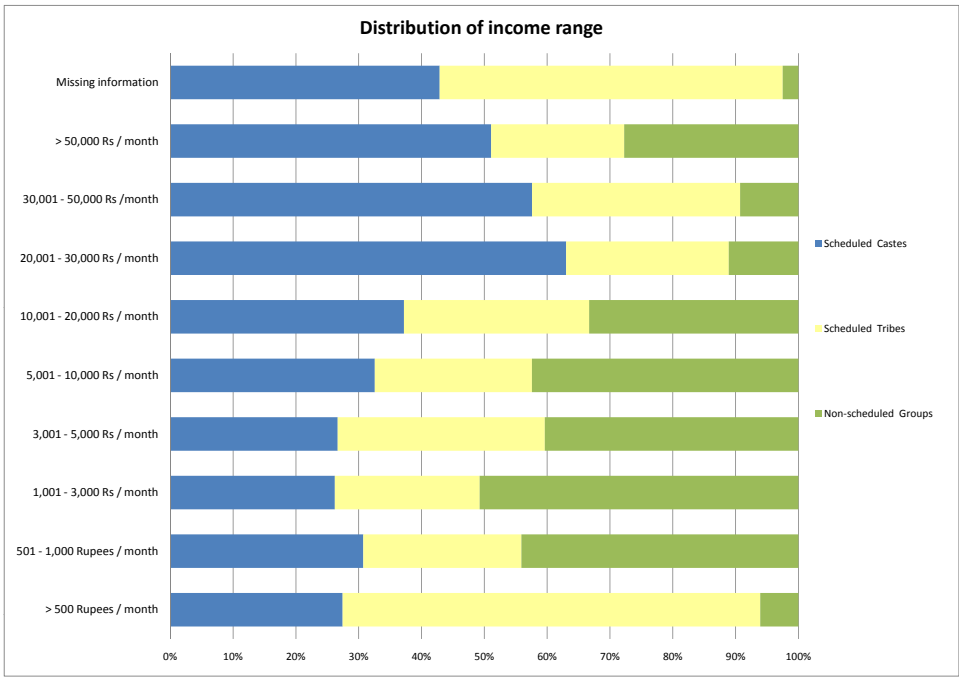
	SC versus ST	SC versus Non-scheduled	ST versus Non-scheduled	Scheduled versus Non-scheduled	All three groups
Pearson χ^2	301.48	139.48	127.56	77.1905	414.63
P-value	0.000	0.000	0.000	0.000	0.000

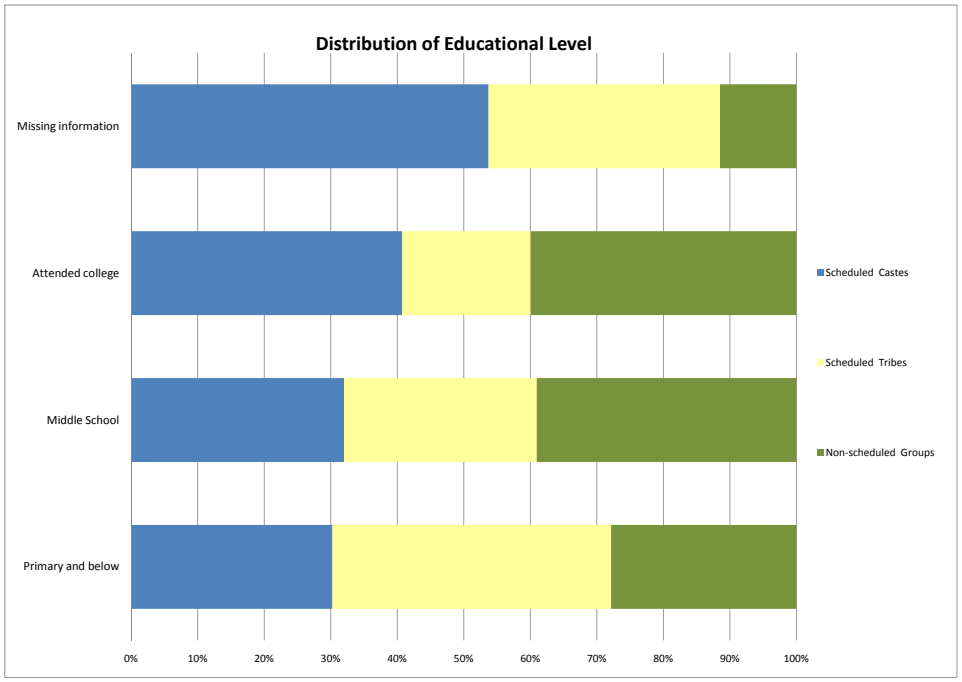
Tab. 4.11 – Pearson's χ^2 test for homogeneity of distribution of assumed determinants across castes

		SCs versus STs	SCs versus non-scheduled	STs versus non-scheduled	All three groups
Education					
	Pearson's Chi2	88.2307	7.9783	114.4352	132.5925
	P-value	0.000	0.019	0.000	0.000
Income					
	Pearson's Chi2	79.9615	206.4024	264.422	379.658
	P-value	0.000	0.000	0.000	0.000
Occupation					
	Pearson's Chi2	133.9157	197.1181	242.1787	410.5238
	P-value	0.000	0.000	0.000	0.000
Manual occupation					
	Pearson's Chi2	81.4965	0.7256	100.1947	123.5075
	P-value	0.000	0.394	0.000	0.000

FIG. 4.2 – Distribution of characteristics by caste







The table below supports our claim that being a professional is the highest paying occupation, as well as the occupation1 aggregate that encompass professionals, employer / manager / foreman, supervisor office, member of armed force and unoccupied. This table also provide some support about the fact that unoccupied individuals should not bee seen as in dire straits.

TAB. 4.12 – Distribution of income ranges across occupations

	Income range						
	1	2	3	4	5	6	7
Occupation							
Employer / Manager / Foreman	4%	4%	22%	20%	29%	14%	7%
Professional worker	5%	2%	10%	13%	24%	35%	11%
Supervisory non-manual office worker	2%	2%	10%	20%	38%	23%	4%
Non manual office worker	9%	15%	31%	17%	16%	10%	3%
Skilled manual worker	12%	9%	33%	19%	16%	8%	3%
Unskilled / semi-skilled manual worker	13%	23%	23%	15%	20%	3%	3%
Farmer cultivating his own farm	6%	13%	35%	22%	13%	9%	2%
Agricultural worker	21%	32%	29%	7%	6%	4%	1%
Member of armed forces	5%	0%	25%	10%	30%	25%	5%
Never had a job	9%	14%	21%	21%	19%	12%	4%

Section 2.2 : Sampling Issue

The table below presents the reconciliation of the educational levels recorded in the World Values Survey and those accounted for in the 2001 Census of India :

Tab. 4.13 – Reconciliation of educational levels between WVS and the 2001 Census of India

WVS labels	**Census of India labels**
Primary and below	Litterate without educationnal level
	Below Primary
	Primary
	Middle
Secondary School	Matric. /Secondary
	Higher Secondary/ Intermediate/Pre-university/Senior Secondary
	Non-technical diploma not equal to degree
	Technical diploma not equal to degree
Attended College	Graduate and above

Tab. 4.14 – States and their populations' distributions accounted for in the World Values Survey sample

State	Nb of districts in the sample		1991 Census
Andhra Pradesh	3	7.6%	7.9%
Assam	1	3.0%	2.7%
Bihar	3	7.4%	10.2%
Chhattisgarh	1	2.3%	*
Delhi	1	2.2%	1.1%
Gujarat	2	5.0%	4.9%
Haryana	1	2.5%	2.0%
Jharkhand	2	3.0%	**
Karnataka	2	5.4%	5.3%
Kerala	2	3.6%	3.4%
Madhya Pradesh	2	5.8%	7.8%
Maharashtra	4	9.7%	9.3%
Orissa	2	3.4%	3.7%
Punjab	1	2.4%	2.4%
Rajasthan	2	5.1%	5.2%
Tamil Nadu	2	6.5%	6.6%
Uttar Pradesh	6	16.5%	16.4%
West Bengal	3	8.6%	8.0%
Others	0	0.0%	3.0%

Source : World Values Survey documentation

* In 1991, Madhya Pradesh and Chhattisgarh were one state

**In 1991, Bihar and Jarkhand were one state

The two graphs below presents the distribution of groups across town sizes for the whole sample and the 2001 round respectively. As mentioned in section 2.2, SCs tend to live in larger towns than non scheduled groups, which may introduce a sampling bias.

FIG. 4.3 – Distribution of groups by town size for the whole sample

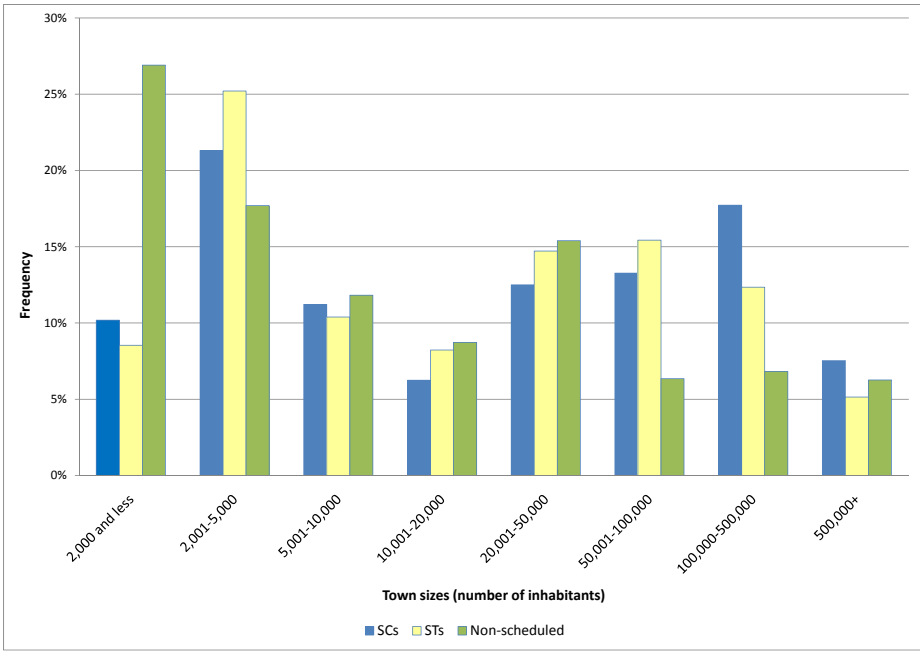
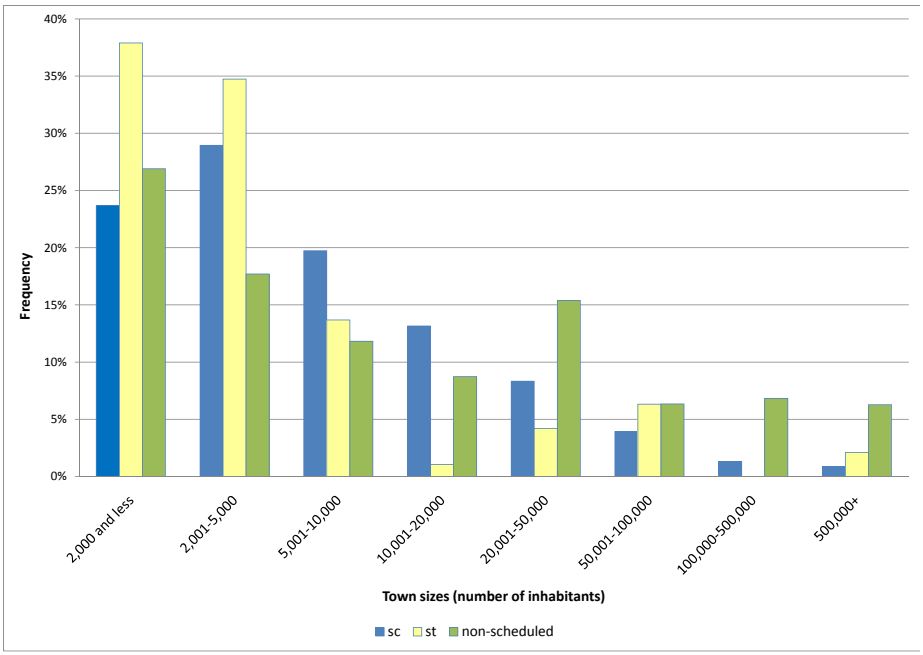


FIG. 4.4 – Distribution of groups by town size for the 2001 sub-sample



Section 3 : Discriminant Analysis of The Data Description of The Method

Let n be the number of observations that can be classified into k groups or in this instance social classes. Population within every class is therefore noted n_k. Let y be the class variable that takes on value $y_1, y_2...y_k$. Let x_{ij} be the vector of characteristics for individual i and j the type of individuals' characteristics such as income, education, occupation etc... Fisher (1936) suggested using a linear combination of the observations of the following form

$$y = u_1x_1 + u_2x_2 + ...u_jx_j + c$$

where y is a latent variable, x_j are independent or discriminating variables, u_j are discriminating coefficients associated with the discriminating variable x_j and c a constant. There exists a function $u(x)$ that maps x and the latent variable y. Such a function is the discriminant function. The objective of the discriminant analysis is to find a function that best separates the groups or in this instance the social classes.

Let's define η_k the center of gravity of the observations in group k, η the center of gravity of the overall distribution, and W_k the variance-covariance matrix for the k^{th} group. W_k describes the within group dispersion. The overall within group dispersion can be calculated as :

$$W = \frac{1}{n}\sum_k n_k W_k \tag{4.10}$$

Between group variability can be described as

$$B = \frac{1}{n}\sum_k n_k(\eta_k - \eta)(\eta_k - \eta)^T \tag{4.11}$$

which represents the sample covariance of the groups means. Total sample variability may be represented by the total covariance matrix V such that :

$$V = B + W \tag{4.12}$$

Given that the objective is to find axes that best separate the k groups. Let's note $u_1(x)$ a vector on which observations will be projected so that

$$u_1'(x)Vu_1(x) = u_1'(x)Bu_1(x) + u_1'(x)Vu_1(x) \tag{4.13}$$

For more convenience, $u_1(x)$ is thereafter noted u_1. The axis Z_1 that best separates the group will be defined through the maximization of :

$$\frac{u_1'Bu_1}{u_1'Wu_1} \text{ or } \frac{u_1'Bu_1}{u_1'Wu_1}$$

which is solved by the following equation :

$$W^{-1}Bu_1 = \lambda u_1 \tag{4.14}$$

The first axis Z_1 and the function that best discriminates u_1 is obtained for the largest value of λ. The second axis Z_2 and discriminant function u_2 comes from the second largest value of λ and so on.

Table below presents the coefficients found for the fist two discriminant functions. These coefficients are the coordinates of the points plotted on graph 2.2.

TAB. 4.15 – Standardized canonical discriminant function coefficients

	$u_1(x)$	$u_2(x)$
Scheduled Castes	-0.288	-0.645
Scheduled Tribes	-0.759	-0.184
Income Range		
1 < 500 Rupees / month	-0.261	0.401
2 501 - 1,000 Rs / month	-0.450	0.244
3 1,001 - 3,000 Rs / month	-0.485	0.819
4 3,001 - 5,000 Rs / month	-0.296	0.962
5 5,001 - 10,000 Rs / month	-0.151	0.778
6 Income range 6 : 10,000 - 30,000 Rs / month	-0.042	0.463
Occupation		
Employer / Manager / Formean	-0.053	0.232
Supervisory non manual office worker	-0.059	0.383
Non manual office worker	-0.169	0.193
Skilled Manual worker	-0.293	0.158
Unskilled or semi-skilled manual worker	-0.357	0.136
Farmer cultivationg his own farm	-0.256	0.448
Agricultural worker	-0.445	0.008
Member of armed force	0.018	0.042
Never had a job	-0.065	0.251
Education		
1 Primary and below	-0.292	-0.122
2 Middle School	-0.036	0.037
Female	-0.016	-0.092
Married	-0.001	-0.064
Age	0.011	-0.001
Townsize	0.009	-0.187
Year 1995	0.712	0.294

SECTION 5 : RESULTS

SECTION 5.1.1 : THE 1995 ISSUE

Comments on the representativeness of the sample

The table below presents the distribution of the observations across sub-samples and groups that are informed for the 3 main set of characteristics (*income*, *education* and *occupation*).

TAB. 4.16 – Distributions of informed observations across groups and samples

	WVS whole sample	WVS 1995 sub-sample	WVS 2001 sub-sample	Census of India 2001
SCs	34.2%	52.4%	15.0%	16.2%
STs	27.4%	47.6%	6.2%	8.2%
Non-scheduled	38.4%	0.0%	78.8%	75.6%
Nb of informed observations	1 658	851	807	

Estimates from the 1995 sub-sample

TAB. 4.17 – Determinants of perceived social class - Base specification - 1995 sub-sample

		(1)	(2)
Group	Scheduled Tribe	-0.924***	-0.933***
		(0.000)	(0.000)
Income	< 500 Rs / month	-0.648***	-0.749***
		(0.001)	(0.001)
	501-1,000 Rs / month	-0.955***	-1.028***
		(0.000)	(0.000)
	1,001-3,000 Rs / month	-0.832***	-0.910***
		(0.000)	(0.000)
	3,001-5,000 Rs / month	-0.655***	-0.741***
		(0.000)	(0.000)
	5,001-10,000 Rs / month	-0.441**	-0.540***
		(0.012)	(0.003)
	10,001-30,000 Rs / month	-0.494***	-0.570***
		(0.003)	(0.001)
Education	Primary and below	-0.281**	-0.310***
		(0.010)	(0.009)
	Middle school	0.097	0.093
		(0.338)	(0.378)
Occupation	Employer / Manager/ Foreman	-0.23	-0.216
		(0.114)	(0.143)
	Supervisory office	-0.286**	-0.229
		(0.038)	(0.108)
	Non manual office	-0.245	-0.257
		(0.147)	(0.129)
	Skilled manual	-0.583***	-0.566***
		(0.003)	(0.004)
	Semi and unskilled manual	-1.039***	-1.035***
		(0.000)	(0.000)
	Farmer : own farm	-0.497***	-0.611***
		(0.001)	0.000
	Agricultural worker	-1.590***	-1.664***
		(0.000)	(0.000)
	Member of armed forces	0.026	0.001
		(0.918)	(0.997)
	Never had a job	0.103	0.008
		(0.805)	(0.985)
Controls	Female		0.049
			(0.560)
	Married		-0.07
			(0.460)
	Age		-0.002
			(0.617)
	town size 2		0.632***
			(0.001)
	town size 3		0.556***
			(0.008)
	town size 4		0.38
			(0.125)
	town size 5		0.301
			(0.139)
	town size 6		0.277
			(0.158)
	town size 7		0.390**
			(0.049)
	town size 8		0.044
			(0.849)
Observations		851	851

Robust p values in parentheses
** significant at 10% ; ** significant at 5% ; *** significant at 1%*

Analysis on the 2001 sub-sample

Estimates from the base model

The table 4.18 presents the results from the estimation of the base model over the 2001 sub-sample. These results should be compared to the ones presented in table 2.9 in section 5.1.

Compared to the results obtained over the whole sample, the effect of being an ST is similar to that of being an SCs. The test of difference in parameters for these two groups dummies conclude that their effects are not statistically different ($\chi^2 = 0.41$). Yet results from table 4.17 show that the two groups' effects were statistically different. As discussed in section 5.1.1, this difference is probably due to a sampling bias.

Compared to the results obtained over the whole sample and with respect to the influences of both Scheduled groups, it is noteworthy that the impact of being from a Scheduled Caste is much higher in the 2001 sample (-0.427 vs -0.625) while that of being from a Scheduled Tribe is lower (-1.225 vs -0.763). Thus comments related to the fact that SCs may be able to improve their perceived social status through likely shifts in other characteristics may not hold anymore, neither those about the implausible shifts needed to cancel the tribe effect. This impression will be rectified or confirmed in the following paragraph.

Tests on Coefficients and Thresholds for Each Variable Type

Education

As far as education is concerned, the conclusion that primary education is the real divide still holds. Indeed, the test of equality of coefficients associated with secondary school and primary do conclude that they differ ($\chi^2 = 6.44\,;\, P > \chi^2 = 0.0112$). Results from table 4.18 also show that the impact of secondary education is significantly different from that of primary but not from that of university attendance. Moreover, there is no differing effect between secondary school and college attendance. As before, education plays a relatively little role, given that going beyond primary education may hardly cancel half of the Scheduled group effect.

Occupation

The table below presents the matrix for the χ^2 tests of differences in parameters for occupations. Please note that no individual is enrolled in the army in this subsample.

TAB. 4.18 – Determinants of perceived social class - Base Specification - 2001 subsample

		(1)	(2)	(3)
Group	Scheduled groups	-0.714***		
		(0.000)		
	Scheduled Caste		-0.679***	-0.625***
			(0.000)	(0.000)
	Scheduled Tribe		-0.786***	-0.763***
			(0.000)	(0.000)
Income	< 500 Rs / month	-0.906	-0.906	-0.933
		(0.123)	(0.123)	(0.113)
	501-1,000 Rs / month	-1.375**	-1.374**	-1.303**
		(0.012)	(0.012)	(0.020)
	1,001-3,000 Rs / month	-1.118**	-1.116**	-1.004*
		(0.036)	(0.036)	(0.065)
	3,001-5,000 Rs / month	-0.914*	-0.908*	-0.754
		(0.084)	(0.086)	(0.165)
	5,001-10,000 Rs / month	-0.601	-0.598	-0.46
		(0.249)	(0.251)	(0.388)
	10,001-30,000 Rs / month	0.087	0.091	0.262
		(0.869)	(0.862)	(0.619)
Education	Primary and below	-0.303***	-0.302***	-0.308**
		(0.004)	(0.004)	(0.013)
	Middle school	-0.01	-0.007	-0.033
		(0.925)	(0.946)	(0.762)
Occupation	Employer / Manager/ Foreman	0.041	0.039	0.015
		(0.777)	(0.787)	(0.918)
	Supervisory office	-0.06	-0.063	-0.042
		(0.686)	(0.675)	(0.788)
	Non manual office	-0.738***	-0.738***	-0.720***
		(0.002)	(0.002)	(0.003)
	Skilled manual	-0.749***	-0.754***	-0.750***
		0.000	0.000	0.000
	Semi and unskilled manual	-0.891***	-0.901***	-0.906***
		(0.000)	(0.000)	(0.000)
	Farmer : own farm	-0.285*	-0.280*	-0.21
		(0.058)	(0.063)	(0.195)
	Agricultural worker	-0.442**	-0.451**	-0.385*
		(0.035)	(0.036)	(0.078)
	Never had a job	-0.178	-0.179	-0.103
		(0.310)	(0.309)	(0.601)
Controls	Female			-0.067
				(0.434)
	Married			-0.035
				(0.720)
	Age			0.001
				(0.845)
	town size 2			-0.518***
				0.000
	town size 3			-0.034
				(0.828)
	town size 4			-0.371**
				(0.010)
	town size 5			0.173
				(0.263)
	town size 6			-0.277*
				(0.068)
	town size 7			-0.363**
				(0.026)
	town size 8			0.078
				(0.718)
Observations		807	807	802

Robust p values in parentheses

* significant at 10% ; ** significant at 5% ; *** significant at 1%

TAB. 4.19 – χ^2 test of difference in parameters - occupations - 2001 sub-sample

	Supervisory office worker	Non manual office worker	Skilled manual worker	Semi and unskilled manual worker	Farmer own farm	Agricultural laborer	No job
Employer / Manager	0.17	10.82***	20.29***	21.35***	2.93*	4.31**	0.48
	(0.684)	(0.001)	(0.000)	(0.000)	(0.087)	(0.038)	(0.490)
Supervisory office		8.35***	14.87***	16.22***	1.31	2.73*	0.11
		(0.004)	(0.000)	(0.000)	(0.253)	(0.099)	(0.735)
Non manual office			0.01	0.52	5.43**	1.90	6.26**
			(0.905)	(0.471)	(0.020)	(0.169)	(0.012)
Skilled manual				0.58	11.22***	3.35	10.66***
				(0.448)	(0.001)	(0.067)	(0.001)
Semi and unskilled manual					14.36***	5.78**	14.24***
					(0.000)	(0.016)	(0.000)
Farmer : own farm						0.92	0.49
						(0.336)	(0.485)
Agricultural laborer							1.85
							(0.174)

Robust p values in parentheses ; *significant at 10% ; ** significant at 5% ;*** significant at 1%

The tests show that there is no significant difference in the effect of being a professional worker, an employer, a supervisory office worker and the intriguing "never had a job" category. Thus these four categories are combined in a single variable, labeled *Occupation 1*. Please note that this group is similar to the one formed over the whole sample.
Results from table 4.19 show that coefficients associated with being employed as a non-manual office or as a manual worker, whether skilled or unskilled are not statistically different. Thus these occupations are grouped under the label *Occupation 2*. Next, the impact of cultivating one's own farm and of being employed as an agricultural worker do not seem to differ and these two categories are regrouped under the term *Occupation 3*. Table 6 below presents the 3 categories and should be compared with table 5.1.2.

Tab. 4.20 – New occupation aggregates - 2001 sub-sample

Aggregate	Corresponding occupations
Occupation 1	Professional worker
	Employer / Manager / Foreman
	Supervisory office position
	Unoccupied
Occupation 2	Non manual office worker
	Skilled Manual
	Semi or unskilled manual worker
Occupation 3	Farmer : own farm
	Agricultural laborer

The divide between supervisory positions and others remain. Yet, while previous results underlined a divide between occupations that required capital and those who do not, this set of results stresses more the divide between rural occupations and more urban ones. However, the estimates of the difference in coefficients associated with the three occupational groups presented below in table 4.21, show that the divide between supervisory positions and the rest is the largest. Moreover, the size of the difference precludes the creation of a categorical variable for occupations, contrary to what I was able to do in chapter 2.

It is noteworthy that switching from the second occupational category to a managing position has a larger effect than that of being from a scheduled group. On the other hand, going out of the rural occupation category to the next has an effect not too far in magnitude from the impact of being from a scheduled group (0.714 vs 0.522). Thus, assuming that the effect of occupational categories does not vary across groups, an improvement in the occupational status may cancel the scheduled group effect on perceived social class. As we shall later see, acquiring a managing position is the most effective way of canceling the burden of being from a Scheduled Group, compared to income or education.

TAB. 4.21 – Estimates of the difference in coefficients - occupation groups - 2001 sub-sample

$\beta_{occupation_j} - \beta_{occupation_{j+1}}$		
	j = 1	j = 2
j + 1	0.738***	0.522**
	(0.000)	(0.000)

p values in parentheses ; *significant at 10% ;
** significant at 5% ;***significant at 1%

Income

As far as incomes are concerned, the table below presents the tests of differences in parameters.

TAB. 4.22 – χ^2 test of difference in parameters - income - 2001 sub sample

	Income 2	Income 3	Income 4	Income 5	Income 6
Income 1	1.34	0.00	0.91	4.33**	18.97***
	(0.246)	(0.985)	(0.341)	(0.038)	(0.000)
Income 2		5.51**	12.67***	29.52***	58.79***
		(0.019)	(0.000)	(0.000)	(0.000)
Income 3			4.56**	22.9***	55.79***
			(0.033)	(0.000)	(0.000)
Income 4				6.26**	36.21***
				(0.012)	(0.000)
Income 5					23.42***
					(0.000)

Robust p values in parentheses ;
*significant at 10% ; ** significant at 5% ;***significant at 1%

The only categories that may be aggregated are the first and second ranges of income as well as the sixth and seventh. Thus, we are left with 5 income categories labeled *revenue* for more clarity. The categories are detailed below.

TAB. 4.23 – New income categories - 2001 sub-sample

Revenue 1	up to 1,000 Rs / month
Revenue 2	1,001 - 3,000 Rs / month
Revenue 3	3,001 - 5,000 Rs / month
Revenue 4	5,001 - 10,000 Rs / month
Revenue 5	More than 10,000 Rs / month

The difference in coefficients are then estimated and presented in the table 4.24 :

TAB. 4.24 – Estimates of the difference in coefficients - income ranges

$\beta_{revenue_j} - \beta_{revenue_{j+1}}$				
	j=1	j=2	j=3	j=4
j+1	0.2687**	0.2586**	0.2920**	0.6726***
	(0.032)	(0.036)	(0.013)	(0.000)

p values in parentheses ;
*significant at 10% ; ** significant at 5% ;*** significant at 1%

What stands out from the table is that going from one revenue range to the next as the same effect across all ranges except for the last one. Thus the revenue variable may recoded as a categorical variable, while introducing a dummy to control for the last category.

Can likely shifts in income ranges cancel the SC and ST effects ? Unfortunately, results from the estimation over the 2001 sub-sample are less optimistic than the one presented in the chapter. Given that being an SC has a stronger effect in this sub-sample, an SC has to increase his income by three ranges to cancel the caste effect. The same holds for the tribes. In concrete terms, an individual belonging to a Scheduled group must see his income multiplied by five from 1,000Rs per month to at least 5,000Rs per month, or shift from the 5,000Rs per month range to the over 10,000Rs range, to counterbalance the effect of his group. This is quite a large change, especially in comparison to an average monthly income of 3,000Rs in India.

So far, I have assumed that the effect of the characteristics do not vary across groups, which should be verified. Unfortunately, the sizes of the SC and ST populations are too small (121 and 50 respectively) to be able to compare the joint effect of the characteristics across the three groups. Thus I may only be able to test whether the effect of characteristics, besides groups, differ between the scheduled and non-scheduled groups. The likelihood ratio χ[29] concludes that the parameters vector do not significantly differ between the two groups, which contradicts the results obtained over the whole sample.

[9]the likelihood ratio χ^2 test is assessed at 18.42

TAB. 4.25 – Comparison of the findings from the analysis over the 2001 sub-sample and from the whole sample

Common conclusions		
Being from a scheduled group has a strong effect on perceived social class Yet, other characteristics such as occupation, income and education have a relevant impact on the perception of social class Primary education is the real divide as far as perceived social class is concerned and its impact is relatively modest A supervisory position is a strong determinant of perceived social class and may cancel the SC effect Although relatively large increase in income is necessary to reverse the SC effect, such an increase is not implausible		
Diverging results		
Issues	**Whole sample**	**2001 sub-sample**
SC vs ST	The effect of being an ST is significantly stronger than that of being an SC	There is no difference in impact between the two scheduled groups
Capital acquisition vs. Agricultural work.	The impact of occupational categories stresses the importance of capital acquisition	The influence of occupations stresses the negative effect of agricultural work
Reversal of the ST effect : occupation	No likely shift in occupational categories may cancel the ST effect	Reversal of the ST effect may be achieved through managerial positions
Reversal of the ST effect : income	Very unlikely shifts are necessary to cancel the ST effect	Large shifts are necessary although not implausible
Indirect group's effect	There is an indirect effect of group through a reduced impact of income	No indirect group's effect is found although sample sizes may be an issue

Section 5.1.2. Tests on Coefficients and Thresholds for Each Variable Type

As mentioned in section 5.1.2 the impact of being a supervisory office worker is not significantly different from belonging to the *occupation*1 group, when the latter is omitted, and as testified by the results exhibited in table 4.26 below

Tab. 4.26 – Estimation of the model when the omitted category is *Occupation 1*

		(1)
Caste	Scheduled Caste	-0.425***
		0.000
	Scheduled Tribe	-1.233***
		0.000
Income	< 500 Rs / month	-0.717***
		0.000
	501-1,000 Rs / month	-1.177***
		0.000
	1,001-3,000 Rs / month	-0.943***
		0.000
	3,001-5,000 Rs / month	-0.721***
		0.000
	5,001-10,000 Rs / month	-0.483***
		(0.004)
	10,001-30,000 Rs / month	-0.319**
		(0.050)
Education	Primary and below	-0.355***
		0.000
Occupation	**Supervisory office**	**-0.116**
		(0.158)
	Non manual office	-0.367***
		(0.004)
	Skilled manual	-0.595***
		0.000
	Semi and unskilled manual	-0.873***
		0.000
	Farmer : own farm	-0.290***
		0.000
	Agricultural worker	-0.948***
		0.000
Observations		1653

Robust p values in parentheses

* significant at 10% ; ** significant at 5% ; *** significant at 1%

Includes control variables such as year 1995 dummy, age, gender, marital status and town size etc.

Appendix to chapter 3 : Untouchability and Public Infrastructure

TAB. 4.27 – Correlation coefficients across water sources

	Tap	Tubewell	Tank	Well
Tap	1			
Tubewell	0.185***	1		
Tank	-0.1499***	0.0236	1	
Well	-0.4518***	-0.0313	0.3271***	1

Robust p values in parentheses ; *significant at 10% ; ** significant at 5% ;*** significant at 1% ; include control variables

TAB. 4.28 – Type of Water Access Effect on the Number of Crimes against SCs and STs

	Total number of crimes against SCs and STs				
	(1)	(2)	(3)	(4)	(5)
Water	12.49***	12.27***	11.26***	6.513	8.858**
	(0.00278)	(0.00344)	(0.00781)	(0.11500)	(0.03070)
Tot. nb. crimes	0.00954***	0.00916***	0.00865***	0.00723***	0.00776***
against non-scheduled.	(0.00000)	(0.00001)	(0.00003)	(0.00054)	(0.00018)
ln (population)	16.11**	19.20***	17.52**	32.86***	29.30***
	(0.02820)	(0.00958)	(0.01870)	(0.00000)	(0.00000)
% dist. Pop. rural	-47.17	-50.89	-43.56	-39.1	-49.2
	(0.17100)	(0.14200)	(0.20600)	(0.26700)	(0.16100)
% dist. pop SC	343.4***	359.9***	1118***		
	(0.00000)	(0.00000)	(0.00000)		
% dist. pop SC^2			-2116***		
			(0.00014)		
% dist. pop ST	13.29	13.69	-39.86		
	(0.63700)	(0.62800)	(0.53400)		
% dist. pop ST^2			132.4*		
			(0.08210)		
literacy rate	-163.1***	-168.8***	-152.4***	-153.8***	-141.3***
	(0.00020)	(0.00013)	(0.00056)	(0.00057)	(0.00140)
Religious polarization $\alpha = 1.6$		-401.5***	-311.2***	-445.6***	-444.1***
		(0.00035)	(0.00658)	(0.00010)	(0.00008)
Religious polarization $\alpha = 0$	-105.6***				
	(0.00027)				
Caste polarization $\alpha = 0$				88.14**	
				(0.01640)	
Caste polarization $\alpha = 1.6$					793.0***
					(0.00000)
Observations	573	573	573	573	573

TAB. 4.29 – Type of Water Access Effect on the Percentage of Crime - individual water access modes

	Percentage of Crime					Marginal
	(1)	(2)	(3)	(4)	(5)	Effect
% dist. pop water access tanks	0.0231*	0.0198	0.0223*	0.0292**	0.0316**	0.019
	(0.0128)	(0.0127)	(0.0127)	(0.0129)	(0.0134)	
% dist. pop water access wells	0.0175*	0.0164*	0.0173*	0.0107	0.0252**	0.017
	(0.00921)	(0.00921)	(0.00916)	(0.00951)	(0.00987)	
% dist. pop water access tubewells	-0.0319***	-0.0299***	-0.0315***	-0.0339***	-0.0347***	-0.026
	(0.00914)	(0.00915)	(0.00901)	(0.00915)	(0.00950)	
% dist. pop water access tap	0.00378	0.00332	0.00493	-0.000719	0.00805	-
	(0.00911)	(0.00916)	(0.00915)	(0.00917)	(0.0103)	
ln district population	0.00301	0.00372	0.00232	-0.00765**	0.000662	-
	(0.00272)	(0.00271)	(0.00270)	(0.00385)	(0.00287)	
% district pop rural	-0.0237	-0.0185	-0.0199	-0.0255	-0.0371**	-
	(0.0161)	(0.0160)	(0.0159)	(0.0160)	(0.0171)	
literacy rate	-0.0672***	-0.0712***	-0.0698***	-0.0670***	-0.0395	-0.056
	(0.0249)	(0.0249)	(0.0248)	(0.0247)	(0.0299)	
Religious polarization alpha=1.6	-0.208***	-0.214***		-0.207***	-0.150**	-0.174
	(0.0576)	(0.0581)		(0.0572)	(0.0633)	
Caste polarization alpha=16	0.211**			0.146*	0.199**	-
	(0.0844)			(0.0857)	(0.0909)	
Caste polarization alpha=0		0.0113	0.0140			-
		(0.0182)	(0.0181)			
Religious polarization alpha=0			-0.0567***			-
			(0.0146)			
ln state GDP				0.0113***		-
				(0.00312)		
Human development index as of 91					-0.121**	-
					(0.0483)	
Observations	573	573	573	571	527	

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

TAB. 4.30 – Type of Water Access Effect on the Percentage of Crime

	Percentage of Crime	
	(1)	(2)
Water	0.00742***	0.00874***
	(0.000428)	(1.49e-07)
ln district population	-0.000920	-0.000695
	(0.770)	(0.791)
% district pop rural	-0.0165	-0.0185
	(0.289)	(0.125)
% dist. pop SC	0.445***	0.467***
	(1.96e-05)	(1.60e-08)
% dist. pop SC2	-0.858***	-0.896***
	(0.00173)	(2.65e-05)
% dist. pop ST	-0.0735**	-0.0331
	(0.0209)	(0.249)
% dist. pop ST2	0.144***	0.0509
	(0.000110)	(0.233)
literacy rate	-0.0610***	-0.0594***
	(0.00458)	(0.000456)
Religious polarization alpha=1.6	-0.194***	-0.152***
	(0.000638)	(0.000559)
Observations	573	530
Sample	All states	Tribal states removed

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

TAB. 4.31 – Type of Water Access Effect on the Percentage of Crime - estimates from reduced samples

	(2)			(3)			(5)		
	Whole sample	Sample - 4 obs.	Sample - 12 obs	Whole sample	Sample - 4 obs.	Sample - 12 obs	Whole sample	Sample - 4 obs.	Sample - 12 obs
Water	0.00713***	0.00548***	0.00488***	0.00742***	0.00503***	0.00437***	0.00605***	0.00365***	0.00315***
	(0.00070)	(0.00002)	(0.00001)	(0.00043)	(0.00011)	(0.00011)	(0.00329)	(0.00424)	(0.00448)
ln (population)	(0.00071)	(0.00284)	-0.000731	-0.00092	-0.00393**	-0.00184	0.000761	0.00253	0.00387***
	(0.81900)	(0.13400)	(0.65800)	(0.77000)	(0.04190)	(0.27100)	(0.76200)	(0.10500)	(0.00482)
% dist. Pop. rural	(0.02200)	(0.01230)	-0.0108	-0.0165	-0.00918	-0.00782	-0.0163	-0.00612	-0.00488
	(0.16100)	(0.19900)	(0.19500)	(0.28900)	(0.33800)	(0.34400)	(0.30400)	(0.53300)	(0.56500)
Literacy rate	-0.0630***	-0.0867***	-0.0728***	-0.0610***	-0.0823***	-0.0685***	-0.0624***	-0.0744***	-0.0620***
	(0.00362)	(0.00000)	(0.00000)	(0.00458)	(0.00000)	(0.00000)	(0.00440)	(0.00000)	(0.00000)
% dist. pop SC	0.148***	0.117***	0.104***	0.445***	0.348***	0.322***			
	(0.00001)	(0.00000)	(0.00000)	(0.00002)	(0.00000)	(0.00000)			
% dist. pop ST	0.02090	(0.01320)	-0.0108	-0.0735**	-0.0193	-0.0098			
	(0.13300)	(0.12700)	(0.14600)	(0.02090)	(0.32600)	(0.56300)			
% dist. pop SC^2				-0.858***	-0.646***	-0.607***			
				(0.00173)	(0.00010)	(0.00002)			
% dist. pop ST^2				0.144***	0.0258	0.0154			
				(0.00011)	(0.27500)	(0.45200)			
Religious polarization $\alpha = 1.6$	-0.224***	-0.137***	-0.135***	-0.194***	-0.109***	-0.109***	-0.252***	-0.149***	-0.145***
	(0.00007)	(0.00007)	(0.00001)	(0.00064)	(0.00171)	(0.00029)	(0.00001)	(0.00002)	(0.00000)
Caste polarization $\alpha = 1.6$							0.175**	0.277***	0.242***
							(0.03740)	(0.00000)	(0.00000)
Observations	573	568	561	573	568	561	573	568	561

p-values in parentheses

*** p<0.01, ** p<0.05, * p<0.1

For more clarity only specifications (2), (3) and (5) are reproduced although the significance of the water variable remains for specifications (1) and (4) presented in table 3.3

TAB. 4.32 – Number of cases registered under different crime heads - 2001 - All India

	Total number of cases	Total number of cases against SCs / STs
Murder	35,827	919
Rape	15,921	1,898
Kidnapping	22,304	466
Dacoity	6,032	68
Robbery	19,674	204
Arson	10,456	459
Hurt	268,669	5,286
Preparation for dacoity	1,603	
Burglary	100,113	
Theft	245,346	
Riots	75,578	
Breach of trust	14,616	
Cheating	44,263	
Counterfeiting	1,520	
Dowry	6,821	
Molestation	33,891	
Sexual Harassment	9,595	
Family Cruelty	48,886	
Import of girls	114	
Death by negligence	56,755	
Attempt to commit murder	31,298	
Culpable Homicide not amounting to murder	3,348	
Other crimes classified under IPC	692,576	
PCRA		685
PAA		14,799
Other		14,627
Total	**1,745,206**	**39,411**

Appendix to chapter 4 : Social Fragmentation And Public Goods

TAB. 4.33 – Correlation between fractionalization and government's NGOs programs

	Total Money Allocated To Governments' Programs	Number Of Government's Program	Number Of NGO Programs
Fractionalization	0.0138	0.0424	-0.0344
	(0.881)	(0.646)	(0.709)

P-value in parenthesis

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Résumé

Cette thèse s'inscrit dans le courant de pensée qui vise à réintégrer les institutions et l'identité sociales en économie et ce pour trois raisons. Premièrement, de nombreuses expériences comportementales ont mis à mal le modèle conventionnel de l'agent égoïste maximisateur en raison notamment du rôle joué par les normes sociales. Deuxièmement, les groupes sociaux, et l'identité qui en découle, peuvent déprécier les attentes des individus les plus démunis et limiter leurs "capabilités" selon le terme de A. Sen. Dernièrement, ces institutions peuvent contrecarrer l'allocation efficiente des ressources. Dans cette thèse, nous présentons un modèle qui décrit la ségrégation comme un des équilibres provenant d'une distribution inégale du pouvoir. L'intérêt de ce modèle réside, premièrement, dans la reconnaissance que les sociétés ségréguées sont aussi celles où le pouvoir est très inégalement réparti, deuxièmement, dans le fait que la ségrégation peut apparaitre en l'absence de préjugés, troisièmement dans les définitions données du pouvoir et de la ségrégation qui sont suffisamment amples pour recouvrir un grand nombre de situations, et enfin, dans le processus qui mène d'une situation neutre à la ségrégation. Dans le second chapitre nous montrons que la caste détermine considérablement le statut social perçu des intouchables et des tribus. Néanmoins, d'autres facteurs comme le revenu, la profession et dans une moindre mesure l'éducation ont aussi une importance. De plus la caste a un effet à la fois direct et indirect, ce dernier s'exprimant par une influence réduite du revenu sur le statut social perçu. Nous interprétons ces résultats comme l'internalisation de la discrimination subie depuis des siècles, qui abaisse l'image de soi et diminue les attentes. Dans le troisième chapitre, nous mettons en évidence la persistance des pratiques d'intouchabilité. Nous montrons que le nombre de crimes contre les intouchables est positivement relié à une distribution communautaire de l'eau. Les règles de castes prohibent le contact des intouchables avec les sources d'eau des castes supérieures. Bien que ces règles soient anticonstitutionnelles, elles sont encore largement appliquées et de manière violente. A priori, ces règles ne concernent pas uniquement l'eau mais aussi une grande partie des biens publics, ce qui laisse à penser que ces derniers sont en réalité des biens de club ou de caste. Ce dernier point est étudié dans le chapitre 4. Nous montrons que si l'indice de fractionalisation a un effet sur la présence dans les villages de biens publics, cet effet est essentiellement positif. En revanche les indices de polarisation ne semblent pas avoir d'impact. Nous interprétons ce résultat, contraire à bon nombre de ceux obtenus auparavant, comme le fait qu'il existe du patronage de castes. Cette hypothèse est testée à la fin du chapitre. Les résultats semblent indiquer que les castes s'approprient l'usage des biens fournis publiquement. En conclusion, nous proposons des pistes de recherche, visant, essentiellement, à améliorer la compréhension de la formation des identités sociales et les raisons de leurs mises en exergue.

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